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BULLETIN OF THE UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS FROM THE UNITED STATES NATIONAL HERBARIUM

VOLUME 38

[final volume of series]

FERNS AND GESNERIADS

C. V. MORTON

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Publications of the United States National Herbarium

The United States National Herbarium, which was founded by the Smithsonian Institution, was transferred in the year 1868 to the Department of Agriculture and continued to be maintained by that department until July 1, 1896, when it was returned to the official custody of the Smithsonian Institution. The Department of Agriculture, however, continued to publish the series of botanical reports entitled "Contributions from the United States National Herbarium," which it had begun in the year 1890, until, on July 1, 1902, the National Museum, in pursuance of an act of Congress, assumed responsibility for the publication. The first seven volumes of the series were issued by the Department of Agriculture.

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[Part 8, The American species of Gleicheniaceae, by C. V. Morton, reported in the literature as "in preparation," was never completed by the author.]

Conrad Vernon Morton
(1905–1972)[1]

David B. Lellinger[2]

Conrad Vernon Morton, named Walter Vernon Morton at the time of his birth on 24 October 1905, was the son of Walter Crow Morton and Nioma (later Noma) Bartholomew Morton. He was born in Fresno, California, where his parents had been life-long residents and his father had a roofing and building contractor's business. Walter Crow Morton died when Walter was still young, and in about 1917 his mother married Alva B. McCray, a friend of the family who also had been a resident of Fresno for many years. Mr. McCray was employed by the Santa Fe Railroad. The family home at Fresno included a vineyard and various gardens on the property, and so young Walter was introduced to plants at an early age. As a child, he planted and tended a small garden of his own. His mother was well known in the area for her rose garden; she grew about 130 varieties abundantly.

During his junior and senior high school years, the family lived in Berkeley, where Mrs. McCray's sister and family also resided. The climate there, more moderate than in Fresno, was better for Mrs. McCray's health. When he was in high school, Walter won a fellowship to the local Art Institute. Of all the students in the class, he was the only boy and, for this reason, he did not pursue his study of art very far at that time. After he began his professional career, however, he studied both painting and the piano diligently and mastered and practiced both arts with great pleasure for himself and his friends for the remainder of his life. He was also interested in the history of the cinema, in dramatics, and in philately. (For a more detailed account of Morton's nonbotanical interests, see J. A. Ewan, 1973, *Taxon*, 22:271–274.)

Morton entered the University of California at Berkeley in 1924.

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[1] An earlier version of this essay was issued 22 June 1973 in the *American Fern Journal*, 63(2):25–48. The author is indebted to Mr. Morton's sister, Mrs. Howard King, for most of the details of his early years.

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At that time he changed his first name to Conrad (the legal change was made on 14 April 1926). His interests at first included the physical sciences, mathematics, astronomy, and slavic languages and literature. During the latter part of his freshman year he began a course in general botany, and in his sophomore year he studied elementary taxonomy under Prof. Willis L. Jepson. Apparently this course triggered a strong interest in taxonomic botany, for he took several more courses from Prof. Jepson, algology and mycology from Prof. Gardner, plant physiology from Prof. Holman, and cytology and genetics from Prof. Goodspeed. Morton's first botanical collections were made around Berkeley in January 1926. He held tuition scholarships at the university for the last three of his undergraduate years: a Levi Strauss Scholar in 1925–26, a Henry Morgan Holbrook Scholar in 1926–27, and a Carrie M. Jones Scholar in 1927–28. He was elected to membership in the scientific fraternity Sigma Xi and in the biological sciences fraternity Phi Sigma. In October 1926 he was inducted into the Alpha chapter (California) of Phi Beta Kappa. He received a Bachelor of Arts degree cum laude from the University of California in May 1928.

After he graduated, he was appointed a Teaching Fellow in Botany for the summer session, but he resigned to take a position as Phanerogamic Aid in the Division of Plants, United States National Museum, Smithsonian Institution. Prof. Jepson wrote a highly favorable recommendation in his behalf.

In his early years at the Smithsonian, Morton worked on flowering plants in general. His first assignment, he once told the author, was to identify some specimens from North Africa. This, in the face of scant literature and fewer specimens, was an initiation—which he surmounted. Much of his time was taken up with identification of phanerogams from the western United States, the Caribbean, Mexico, and Central America. He soon took up the Gesneriaceae and Solanaceae as specialties; both became life-long interests. He spent the spring of 1933 making general collections in Oaxaca, Mexico. On this trip he fell ill with malaria, which recurred from time to time in succeeding years. In 1936 and 1941 he took collecting trips to Cuba. In addition to his research interests, he made thousands of identifications, helped to curate the herbarium, began to compile an index of the genera to the flowering plants (which was not completed), and made indices to some of the larger fern genera in the New World based on the "Index Filicum" and the "Gray Herbarium Card Index." In 1939 he was appointed Assistant Curator of Phanerogams in the Division of Plants. He also began to take post-graduate courses in botany at nearby George Washington University. Although he did not hold a master's degree, he was admitted to the doctoral program

on the strength of several lengthy scientific papers that he had published.

Having published on ferns occasionally since 1932, by the middle 1930s he began to devote more and more of his time to research on, and identification of, the ferns. This was done under the guidance of Dr. William R. Maxon, who was a fern specialist and the Curator of the Division of Plants.

After Maxon's retirement in 1946, the Division of Plants was reorganized as the Department of Botany. Morton was appointed Associate Curator of the Division of Ferns. At this time, owing to the press of official duties, he withdrew from the doctoral program at George Washington University. The following year he made extensive general collections on the island of St. Vincent and explored a newly discovered valley in the mountainous interior of the island. In 1948 he was appointed Curator of the Division of Ferns, a position he held until 1970. From 1948 to 1959 he also held the title of Acting Curator of the Division of Cryptogams. This was a period of severe staff shortages, and his role in that division did not extend beyond maintaining the collections.

From 1950 to 1954 Morton was a member of the International Botanical Congress Committee on Nomenclature. In 1951 he accompanied Dr. L. O. Williams on a field trip to Honduras. The fern specimens from this trip were to help form the basis for a fern Flora of that country, but the project remained in rough manuscript, as did a similar project on the ferns of Guatemala.

Morton realized that the greatest obstacle to preparing tropical fern floristic works was inadequate nomenclatural research. He knew that long trips to study in European herbaria would be necessary to produce adequate treatments of the ferns. He applied for, and in 1954 received, a Simon Guggenheim Foundation fellowship to study type specimens of ferns in European herbaria. The National Science Foundation awarded him grants for the same purpose in 1957 and 1963. He searched portions of the herbaria at Berlin, Brussels, Copenhagen, Edinburgh, Florence, Geneva, Hamburg, Kew, Leiden, Liverpool, London (British Museum), Oslo, Oxford, Munich, Paris, Stockholm, Utrecht, Vienna, and Zurich, and took more than 22,000 photographs, including some in his phanerogamic specialties. The extensive labels that accompany the photographs are valuable because they convey the results of Morton's painstaking research into the type status and taxonomic disposition of each specimen.

In 1956 he took a third and last field trip to Cuba. From that time on he was fully occupied with administrative, research, and identification duties. Occasionally he attended field forays sponsored by the American Fern Society. He also took several pack trips in the western

United States, but these were an extension of his interest in wilderness and its conservation and were not undertaken from a botanical standpoint. In 1961 he suffered the first of a series of heart attacks. For a decade he felt that these precluded field work. Despite his afflictions, which included the almost total loss of sight in one eye because of a detached retina, he continued to work in the herbarium and to take frequent trips to other herbaria.

From the early 1960s he worked mostly on ferns and, for a time, did little with his phanerogamic specialties. He headed the International Botanical Congress Special Committee for the Study of Superfluous Names during its period of activity in 1968 and 1969. In June 1970 he represented the Smithsonian Institution at the tercentenary celebration of the Royal Botanic Garden, Edinburgh. He greatly enjoyed a tour on which he visited gardens all over Scotland. In 1970 he was made a Senior Botanist at the Smithsonian, a position that freed him from administrative duties. He returned to his interest in the Solanaceae and began to complete a manuscript on Argentine *Solanum*. He was awarded a Smithsonian Research Foundation grant for field work and herbarium study in Argentina and spent three months there in early 1972. On his return from the field, he continued to work hard on his *Solanum* manuscript and seemed to be in better health than usual, but a few months later, on 29 July 1972, he passed away unexpectedly at his home in Washington.

Morton was an honorary life member of the American Gesneria Society and an honorary member of the American Fern Society. He served as associate editor of the *American Fern Journal* from 1941 to 1947 and from 1962 to 1972, and he was the editor-in-chief from 1948 to 1961. He is commemorated by the genera *Mortoniella* Woodson and *Mortoniodendron* Standl., and by the following botanical names: *Asplenium mortonii* Duek, *Banisteria sprucei* var. *mortoniana* Macbr., *Besleria mortoniana* Steyerm., *Capsicum mortonii* Raymond, *Clidemia mortoniana* Standl., *Columnea mortonii* Raymond, *Cyphomandra mortoniana* Smith & Downs, *Erigeron mortonianum* Reveal, *Eupatorium* × *mortonianum* Alain, *Gesneria mortonii* Wiehler, *Hiraea sprucei* var. *mortoniana* Macbr., *Inga mortoniana* León, *Milla mortoniana* Moore, *Niphidium mortonianum* Lellinger, *Schoenocaulon mortonii* Brinker, *Selaginella mortoniana* Crabbe & Jermy, *Tetrapteris jamesonii* var. *mortonii* Macbr. [=*T. mortonii* (Macbr.) Cuatr.], *Thelypteris mortonii* A. Reid Smith, *Tigridia mortonii* Molseed, *Topobea mortoniana* Wurdack, *Viburnum mortonianum* Standl. & Steyerm., *Witheringia mortonii* Hunziker, *Xiphopteris mortonii* Copel., and *Microgramma mortoniana* de la Sota.

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A REVISION OF TRICHANTHA (GESNERIACEAE)

By CONRAD V. MORTON

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM

SMITHSONIAN INSTITUTION • WASHINGTON, D.C. • 1963

A REVISION OF TRICHANTHA (GESNERIACEAE)

Conrad V. Morton

The small genus *Trichantha* Hooker, composed of small, epiphytic herbs or subshrubs with red or red and yellow striped, conspicuous flowers, grows in the mountains of Panama, Colombia, and Ecuador. A member of the African violet family, it was described in 1844 based on two new species, each known from single collections made by Thomas Lobb from unspecified localities in Colombia. The genus has remained one of the least known of the Gesneriaceae. It was originally distinguished from *Columnea* and *Alloplectus* primarily by the presence of small, clavate appendages borne on the corolla tube at the base of the sinuses of the lobes of the limb. These appendages, conspicuous in the living plants but not always obvious in dried material, are of unknown function.

Hanstein [1] reduced *Trichantha* to a synonym of *Columnea* sect. *Stenanthus*. Bentham and Hooker retained it as a distinct genus, placed between *Columnea* and *Alloplectus*, noting that in some characters it was closer to *Alloplectus* than *Columnea*. Fritsch in 1897 (in Engler and Prantl, Die Natürlichen Pflanzenfamilien) expressed the same opinion.

No other species have ever been described in *Trichantha*. However, in 1959 I described a cultivated plant as *Columnea moorei*,[2] placing it in the section *Systelostema* rather than *Stenanthus* because of the leaves being in equal rather than unequal pairs. I did not observe any appendages on the corolla tube, although there is a tuft of hairs in the sinuses where the appendages would be, but Dr. H. E. Moore, who has material growing in the Bailey Hortorium did observe minute appendages in living plants. He subsequently sent me some fresh flowers and I was able to see them too, although it must be admitted that they are extremely minute, almost aborted, and might be overlooked by anyone not definitely searching for them. The presence of appendages indicated a probable relationship between *C. moorei* and *Trichantha*.

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[1] Linnaea 34:387. 1865.

[2] Baileya 7:55. 1959.

Subsequently, Dr. Moore described another cultivated plant as *Columnea illepida* Moore.[3] This species, quite unlike any previously known species of *Trichantha*, was also placed in sect. *Trichantha* on the basis of the presence of appendages on the corolla tube.

A search through the vast quantity of unnamed Gesneriaceae in the U.S. National Herbarium brought to light eight additional species of the most varied nature in regard to the habit, leaves, calyx, and corolla but all with appendages on the corolla. My opinion as to whether all these plants are properly associated by this one character has regularly varied. It is conceivable that these appendages have originated independently in several unrelated groups. On the other hand after now having written careful descriptions of all of them and having thought deeply about them, I believe that they do belong together. Although they are varied I cannot find that any one of them seems to be more closely related to any species of another group of *Columnea* or *Alloplectus* than to each other.

I have veered from this way to that also in regard to the question of including *Trichantha* in *Columnea*. The difficulty is that the sections of *Columnea* are based partly on the character of whether the leaves of a pair are equal or strongly unequal. But in my species of *Trichantha* both kinds of leaves occur, and its species would therefore have to be distributed between two sections, of *Columnea* (sect. *Stenanthus* and *Systelostoma*) or else *Trichantha* retained as a section based on the single character of corolla appendages with leaf characters varying as they do not in other sections of *Columnea*, an uncomfortable situation. It may be that the leaf characters used in *Columnea* are not fundamental and should be abandoned as sectional characters, but I am not as yet prepared to go that far.

Another objection to retaining *Trichantha* as a section of *Columnea* is that it really does have relationships with *Alloplectus*, especially in the character of the quadrate or broader than long anthers. The anthers of *Columnea* are, at least typically, oblong. Some species of *Alloplectus* sens. lat. to be sure do also have oblong anthers, but investigation may show that these species are referable to *Drymonia* or perhaps represent a distinct genus *Erythranthus*.

Inasmuch as the question of generic limits in this group of Gesneriaceae is still controversial, it seems to me wisest to retain *Trichantha* as a genus, with the full realization that further research will very likely bring some realignments. The number of essentially unknown described species and the number of undescribed species, particularly from Colombia, is so large that any attempt at generic or sectional readjustment would be premature.

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[3]Balleya 8:56. 1960.

Genus *Trichantha*

Trichantha Hook. Icon. Plant. 3: *t.666*. 1844.
Columnea sect. *Trichantha* Kuntze in Post & Kuntze, Lex. Pl. Phan. 136. 1904.

Small more or less scandent epiphytic subshrubs or succulent, shrublike herbs, with slender, usually hirsute stems, these often radicant, unbranched above the base; leaves of a pair equal or unusually very unequal, the smaller often stipule-like and often soon deciduous, the larger rather short-petiolate, the blades lanceolate to ovate or even suborbicular, acuminate or cuspidate or rarely obtuse, usually cuneate at the unequal base, rarely rounded, herbaceous in texture, remotely and minutely denticulate above the middle, or (in *T. moorei*) just slightly crenulate, dull green above, rarely shining (in *T. moorei*), green or usually tinged with red beneath, hirsute above with many-celled, yellowish or reddish elongate hairs, hirsute beneath (or rarely strigose), often also sparsely strigillose with minute, straight, appressed, 2-celled, "bayonet"-shaped hairs, the basal cell minute, yellowish or dark, the terminal cell milky-white, very sharp at apex, pinnately veined, the lateral veins mostly 4–7 pairs, obscure above and slightly raised beneath; bracts at base of peduncles minute, hirsute, usually subulate, deciduous; flowers solitary, axillary, or sometimes geminate or ternate, the peduncles elongate, often thickened toward apex, hirsute, often pendulous; calyx 5–lobed to base or nearly, the lobes very slightly unequal, the posterior a little shorter and narrower, usually red but sometimes green or green at base and red at apex, entire (in *T. aliena*), merely deeply toothed (in *T. illepida*), or deeply, pectinate-dissected with narrow central portion and 2–4 pairs of elongate, linear-filiform lateral lobes, hirsute externally with multicellular, usually red-walled hairs and often also with minute appressed 2-celled hairs, often with sessile glands also, inside glabrous, strigose, hirsute, or densely sericeous, often with numerous sessile glands toward base; corolla slightly oblique in calyx, essentially tubular but sometimes a little ventricose in the middle and slightly contracted in the throat, saccate at the posterior base, hirsute with multicellular hairs externally or sometimes densely long-tomentose (in *T. rosea* and *T. aliena*), glabrous within except for the glandular-pilosulous throat, the limb usually narrow, the lobes erect or rarely spreading, slightly or obviously bilabiate, the two upper lobes partly or almost wholly united into an erect galea, the two lateral lobes mostly deltoid, the lower lobe shorter and narrower, hirsute or tomentose externally, glabrous within except for the glandular bases, the tube clear red or usually striped, the base color yellow with dark maroon stripes beginning at the base of the corolla or near the middle and running to the sinus of the lobes or occasionally stopping short

of the limb, the lobes all yellow, yellow with dark margins, red with yellowish margins, or the galea all dark red-maroon, the sinuses of the limb provided with elongate, linear or clavate appendages, these spreading horizontally, yellow or red, hirsute (especially at apex) or long-red-tomentose (in *T. rosea*), or the appendages obsolete and hardly to be observed in dried material (*T. moorei*); stamens 4, connate at base into a sheath up to 1 cm. long, adnate to the very base of the corolla tube, the filaments glabrous, slender, elongate; anthers glabrous, quadrate, or broader than long, at first lightly connate into a square, briefly exserted, later withdrawn into the corolla tube by contortion of the filaments, becoming free; staminodium none; ovary sericeous; style elongate, glabrous or usually pilosulous; stigma bilobed, exserted after the anthers are withdrawn; disk reduced to a large or small, bilobed or entire, glabrous, fleshy, posterior gland, or occasionally (in *T. aliena*) 2 small free, posterior glands; fruit a white spherical berry (in *T. teuscheri*, the only fruit known).

Lectotype: *Trichantha minor* Hook. Of the two original species, *T. minor* is the first one listed and the one combined by Hooker with the generic description.

Key to the Species

Corolla tube densely hirsute-tomentose, the surface completely concealed; corolla lobes fleshy and thick, erect, small, subequal; corolla completely glabrous within throat; style glabrous.

Leaves of a pair subequal, green beneath; calyx lobes entire, ca. 2.8 cm. long, green at base and red at tips; appendages of the corolla 4–6.5 mm. long, red-hirsute . . . . . 1. **T. aliena**

Leaves of a pair strongly unequal, the smaller stipule-like and soon deciduous, strongly tinged with rose beneath, or rarely green; calyx lobes not more than 1.5 cm. long, deeply pectinately dissected, with 2–4 pairs of linear lateral lobes, red throughout; appendages of the corolla extremely conspicuous, 15–20 mm. long, densely rose-tomentose . . . . . 2. **T. rosea**

Corolla tube merely hirsute, much of the surface visible; corolla lobes, at least the lower three, thinner, spreading, the upper two lobes at least partially united into an erect galea; corolla glandular-pilosulous within throat, at least at the base of the galea; style pilosulous.

Calyx lobes spathulate, entire; leaf-blades lanceolate, 5–6 times as long as wide. Leaves of a pair subequal . . . . . 3. **T. formosa**

Calyx lobes toothed or dissected; leaf-blades oblanceolate, lanceolate, elliptic, or suborbicular, relatively broader.

Leaves of a pair equal, very small, 14–16 mm. long; internodes very short only about 1 cm. long; appendages minute, hardly observable in dried material; calyx lobes green, with conspicuous red hairs . . 4. **T. moorei**

Leaves of a pair strongly unequal, the small less than half as long as the larger, often stipule-like and deciduous, the larger at least 30 mm. long or usually much more; internodes at least 2.5 cm. long (except in *T. illepida*); appendages well developed; calyx lobes red (green in *T. illepida*).

Calyx lobes green, pectinate-toothed but not dissected, the teeth 4–6 pairs on each side of the lobes, not more than 2 mm. long; internodes short (1–2.5 cm. long) and stout (the upper ca. 3 mm. in diameter); leaf-blades red-blotched beneath or red all over . . . . . **5. T. illepida**

Calyx lobes red, deeply dissected, the linear-filiform lateral lobes 2–4 pairs, 4–15 mm. long; internodes longer and more slender; leaf-blades green beneath or sometimes tinged with reddish but not red-blotched or deep red all over.

Leaf-blades elliptic or broadly elliptic, short-acuminate or cuspidate, large, the larger 14–15 cm. long and 5 cm. wide or more, hirsute; internodes elongate, mostly 7–12 cm. long (or shorter in *T. tropicalis*); appendages yellow with maroon apex (or clear yellow in *T. tropicalis*).

Corolla clear red, not striped except for 2 inconspicuous dark stripes near the apex on the upper side, these running to the margins of the galea . . . . . **6. T. tropicalis**

Corolla yellow or "citron green," with broad vertical stripes of dark maroon.

Leaf-blades foveolate above, not bullate, beneath without minute, white, 2-celled, appressed, "bayonet"-shaped hairs mixed with the long, pluricellular hairs; galea and lateral and lower lobes apparently all dark maroon . . . . . **7. T. major**

Leaf-blades bullate above, the long hairs borne on tubercles, not foveolate, beneath with some minute "bayonet"-shaped hairs among the long ones; galea yellow with maroon margins, apparently the lateral and lower lobes all yellow . . . **8. T. bullata**

Leaf-blades lanceolate or elliptic-lanceolate, long-acuminate, the larger not more than 5.5–9 cm. long and 3.7 cm. wide; internodes less than 7 cm. long; appendages clear yellow (red in *T. clara*).

Leaf-blades glabrous above except near margin, not at all hirsute beneath but sparsely strigillose with minute, white, appressed, 2-celled, "bayonet"-shaped hairs. Galea dark maroon, the lateral and lower lobes yellow . . . . . **9. T. minor**

Leaf-blades hirsute above, hirsute beneath or strigillose.

Corolla clear light red throughout, not at all striped, the galea darker red, the lateral and lower lobes red with very narrow yellowish margins; appendages red . . . . . **10. T. clara**

Corolla obviously striped with dark maroon, with narrow yellow stripes, the galea maroon and the other lobes yellow or all lobes yellow; appendages yellow.

Corolla tube with broad maroon stripes running to the sinuses of the lobes or up into the galea; galea dark maroon, the other lobes yellow . . . . . **11. T. teuscheri**

Corolla tube with broad maroon stripes and narrow yellow stripes, the maroon stripes fading out before reaching the sinuses of the corolla; galea and other lobes all yellow . . **12. T. elegans**

1. Trichantha aliena Morton, sp. nov.

Caules rubri internodiis elongatis crassis rubro-hirsutis; folia decussata, per paria subaequalia, breviter petiolata, laminis oblongis vel oblanceolatis, utrinque viridibus, apice breviter acuminatis, basi late cuneatis obliquis, utrinque hirsutis subtus non strigillosis; flore

solitarii longe pedunculati; calycis lobi magni integri lanceolati basi angustati apice longe et acriter acuminati, deorsum virides sursum rubri externe hirsuti intus albo-sericei et glandulosi; corolla magna rubra tubulosa basi saccata, tubo externe valde ubique rubro-hirsuto, intus glabro et eglanduloso, limbo vix bilabiato, lobis subliberis subaequalibus crassis erectis posterioribus marginibus inflexis, intus glabris, appendicibus linearibus magnis hirsutis; stylus glaber, sursum ampliatus.

Stems not radicant at the nodes, the internodes elongate, 5–7 cm. long, red, thick, 4 mm. in diameter, hirsute, the hairs spreading, reddish, many-celled, the cross walls dark red, ca. 1.5 mm. long; leaves of a pair subequal, decussate, short-petiolate, the petiole 6–7 mm. long, densely yellow-hirsute, 1–1.5 mm. in diameter, the blades oblong to oblanceolate, 5×2 cm. to 8.5×3.4 cm., short-acuminate, broadly cuneate and slightly unequal at base, remotely denticulate, green on both sides, hirsute above with yellowish, several-celled hairs, whitish hirsute beneath, the hairs many-celled, ca. 3–4 mm. long, small "bayonet"–shaped hairs absent, the lateral veins 6 or 7 pairs, obscure above, slightly raised beneath; flowers solitary in the leaf-axils, long-pedunculate; bracts minute, subulate, ca. 2 mm. long, hirsute and also sparsely yellow-glandular; peduncles 1.7–2 cm. long, ca. 1.2 mm. in diameter, green, reddish-hirsute; calyx lobes free, very slightly unequal, lanceolate, ca. 2.8 cm. long, ca. 2.5 mm. wide at base, 6.5–7 mm. wide above base, gradually long-sharp-acuminate, entire, herbaceous, green toward base, the upper third conspicuously red, sparsely red-septate-hirsute without, lacking appressed "bayonet"-shaped hairs, thin-white-sericeous within and also glandular; corolla red, ca. 3.8 cm. long, 4 mm. wide at base, 7 mm. wide in the saccate portion above base, then contracted to 4.5 mm., the tube without visible stripes due to the dense pubescence, cylindric, ca. 7 mm. wide, densely hirsute with long, red, multicellular hairs covering the whole surface, glabrous and eglandular within even in throat, the limb small, only slightly irregular, the lobes fleshy, all free, erect, dark red with narrow lighter margins, the two posterior the largest, 4.5–5 mm. long, thick, with incurved margins, densely septate-hirsute externally, glabrous within, the lateral and anterior smaller, ca. 3.5 mm. long, obtusish with incurved apex, the appendages conspicuous, 4–6.5 mm. long, very slender, dark red, conspicuously red-hirsute; stamen sheath ca. 3 mm. long, the filaments very slender, glabrous; anthers included; ovary white-sericeous at apex; style glabrous, strongly thickened upwardly; disk composed of 2 small (1 mm. long), free, posterior glands.

Type in the herbarium of the Royal Botanic Garden, Kew, collected at Altaquer, Department of Nariño, Colombia, May 1876, by E. André (no. 3311).

2. Trichantha rosea Morton, sp. nov.

Caules radicantes, internodiis brevibus gracilibus hirsutis; folia per paria inaequalia, minora stipuliformia; folia majora breviter petiolata, lamina elliptica, longe acuminata, basi obliqua, inconspicue denticulata, supra hirsuta, subtus rosea, hirsuta et strigosa; flores solitarii, bini vel terni; calyx roseus, lobis dissectis, lobis lateralibus 2–4-jugis, linearibus, externe roseo-hirsutus, intus albo-sericeus; corolla pulchella, tubo cylindrico externe dense et perspicue ubique roseo-hirsuto, superficie non visibili, intus in fauce glabro et eglanduloso, limbo regulari, lobis crassis atrorubris parvis erectis, appendicibus valde valde elongatis, 1.5–2 cm. longis, densissime roseo-hirsutis; stylus glaber.

Stems radicant at the nodes, the internodes short, 2–4 cm. long, somewhat zigzag, 3–4 mm. in diameter, shining, somewhat ridged in drying, hirsute, the hairs reddish, spreading, many-celled, borne on slight tubercles; leaves of a pair strongly unequal; larger leaves short-petiolate, the petiole 5–10 mm. long, hirsute, 1 mm. in diameter, the blades narrowly elliptic, 7×2.4 cm. to 9×3.4 cm., herbaceous, gradually long-acuminate at apex, rounded and strongly unequal at base, inconspicuously denticulate, green and sparsely hirsute above, the hairs 5–7 celled, the basal cells paler yellowish and enlarged, the others pale reddish with dark red cross-walls, beneath rose-red all over, hirsute with spreading multicellular reddish hairs and also sparsely strigose with closely appressed, white 2-celled, "bayonet"-shaped hairs about 0.4 mm. long, the lateral veins about 6 pairs, obscure above, elevated beneath; smaller leaves of a pair stipule-like, not over 2.2 cm. long and 1 cm. wide; flowers 1–3 in an axil; bracts minute, linear, scarcely 2 mm. long, hirsute, eglandular; peduncles 7–9 mm. long, hirsute; calyx rose-red, the lobes free, subequal, 13–15 mm. long, the central portion lanceolate-attenuate, ca. 2 mm. wide at base, ca. 3 mm. wide above base, the apical half filiform and scarcely 0.5 mm. wide, dissected, with 2–4 pairs of linear lateral lobes, these up to 5 mm. long and 0.25 mm. wide, conspicuously red hirsute without and on lobes, densely white-sericeous within and also with sessile yellow glands; corolla brilliant rose-red, without visible stripes due to the dense pubescence, ca. 4 cm. long, 4 mm. wide at base, 6.5 mm. wide at the saccate portion above base, above base 3 mm. wide gradually increasing to 6 mm. wide at middle, scarcely if at all contracted in the throat, conspicuously and densely hirsute externally, the hairs red, long, multicellular, completely covering the corolla surface, glabrous within, the limb scarcely bilabiate, narrow, not wider than the tube, the lobes fleshy, dark red within with very narrow yellowish thinner margins, erect, subequal, all free, subtriangular, ca. 4 mm. long and 3 mm. wide at base, acutish, red-hirsute at base externally, white-hirsute at apex,

glabrous and eglandular within, even in throat, the appendages red, extremely conspicuous, 1.5–2 cm. long, very densely hirsute with long red, multicellular hairs; filaments united for 6 mm. at base, extremely slender, ca. 0.25 mm. thick, glabrous; anthers not exserted, connate quadrately at first, broader than long, ca. 1.5 mm. long, 1.7–2 mm. wide, glabrous; ovary small, glabrous at base, sparsely white-pilose at apex; style stoutish, ca. 3.5 cm. long, glabrous; disk reduced to a small, bilobed, thick, glabrous, posterior gland.

Type in the U.S. National Herbarium (no. 2370204), collected at Río Catripe, Intendencia del Chocó, Colombia, at 100 m. elevation, in wet forest, Jan. 17, 1947, by Oscar Haught (no. 5437).

Paratype: Colombia: Between La Oreja and Quibdó, Chocó, Apr. 1, 2, 1931, *W. A. Archer* 1677 (US).

Additional specimen examined: Quibdó, January, 1872, *R. B. White* (*K*). A note by White reads: "Of the enclosed fragment I can only say that it is an herbaceous plant 9 to 12 inches high, alternate lanceolate velvety leaves. Seed? Habitat, Quibdó woods of Atrato Valley. Most lovely colour. It would seem as if all these hairy plants were placed in wet regions to intake the most of the moisture. Nothing can be more lovely than these bedewed flowers. Illness prevented me from attending to the drying of my specimens collected in some parts of my Quibdó journey and thus many were spoilt and lost." Certainly referable to *T. rosea*, but leaves are absent and so the forma is uncertain.

2a. Trichantha rosea forma **viridis** Morton, f. nov.

A f. typica foliis subtus viridibus costa basi excepta differt, foliis forsan majoribus usque ad 17×6.5 cm. longis.

Type in the U.S. National Herbarium (no. 1771980), collected on the ridge along Yeracüi Valley, upper Río San Juan, Corcovado region, Intendencia del Chocó, Colombia, at 200–275 m. elevation, Apr. 24, 25, 1939, by E. P. Killip (no. 35239).

Paratype: Colombia: Córdoba, Dept. El Valle, 50–100 m., Feb. 17, 1939, *Killip & Garcia* 33418 (US).

2b. Trichantha rosea forma **latifolia** Morton, f. nov.

A f. typica foliis brevioribus et latioribus, maximis 6×3 cm., subtus viridibus vel vix roseo-tinctis differt.

Type in the herbarium of the Royal Botanic Garden, Kew, collected in the Department of Antioquia, Colombia, 7700–8800 ft. elevation, June 16, 1880, by W. Kalbreyer (no. 1793).

Paratype: Colombia: Cultivated by Veitch, from seeds sent by Kalbreyer, probably collected at the same time as the type cited above, with which this specimen is mounted (K).

The two leaf variations described above are given only the rank of "forma," since it is uncertain just how taxonomically significant they are. The brilliant rose-colored leaves of f. *rosea* certainly contrast strongly with the green leaves of f. *viridis*, but these two grow in the same geographic and climatic area, the Pacific lowlands (50–275 m.). The small-leaved f. *latifolia* may be more distinct since it comes from the highlands (ca. 2400 m.) of a different department. This species is one of the most distinctive by its regular (not bilabiate), densely rose-tomentose corollas, with extraordinarily long and conspicuous appendages.

3. Trichantha formosa Morton, sp. nov.

Caules graciles, internodiis brevibus roseo-hirsutis; folia non valde inaequalia, petiolata, lamina lineari-oblonga, acuminata, basi cuneata, remote denticulata, utrinque hirsuta, subtus viridi, pilis minutis appressis nullis; flores 1–3 axillares, longe pedunculati, pedunculo roseo-hirsuto; calycis lobi subaequali spathulati integri virides vel rubri, basi angustati, apice acuti, utrinque hirsuti; corolla tubulosa, tubo luteo, perspicue atrorubro-lineato, externe glanduloso-hirsuto et minute pilosulo, limbo parvo bilabiato, lobis rubro-marginatis, intus glabris.

Stems radicant at the nodes, the internodes normally ca. 3 cm. long, 2.5–3 mm. in diameter, densely rosy-hirsute, the hairs many-celled, with reddish lateral walls and dark septae, 2–2.5 mm. long, widely spreading; leaves of a pair slightly but not conspicuously unequal, the smaller more than half as long as the larger, the upper short-petiolate (ca. 7 mm.), the lower longer petiolate (18 mm.), the petiole densely red-hirsute, slender, 0.5–0.8 mm. thick, the leaf-blades linear-oblong, 6×1.2 cm. to 10×1.6 cm., broadest near middle, acuminate, equally cuneate at base, herbaceous, remotely and inconspicuously denticulate, green above, hirsute, the hairs several-celled, pale, ca. 1.5 mm. long, green beneath, the midrib red, densely pale-hirsute or the hairs along the midrib reddish, minute, white, "bayonet"-shaped hairs lacking, the lateral veins ca. 6 pairs, obscure above, slightly elevated beneath; flowers 1 to 3 in an axil, long-pedunculate; peduncles up to 4.2 cm. long, densely rosy-hirsute; calyx lobes green or red, subequal, 9–11 mm. long, spathulate, narrowed at base and ca. 1.5 mm. wide, broadened upwardly, 2.5–3.3 mm. wide, acute at apex, entire, densely hirsute externally, the hairs pale or reddish, several-celled, 1.5–2 mm. long, and also sparingly strigillose with appressed, minute, white, 2-celled, "bayonet"-shaped hairs, densely hirsute within and also with a few, sessile, yellow glands toward the base; corolla ca. 4.3 cm. long, ca. 2 mm. wide at base, ca. 4 mm. wide in saccate portion above base, the tube cylindric, becoming 6 mm. wide

above the middle, very slightly contracted in throat, dull yellow with conspicuous maroon stripes running from near the base to the sinuses, sparsely hirsute externally, the hairs spreading, ca. 2 mm. long, many-celled, the terminal cell glandular, and also with numerous spreading unicellular eglandular hairs 0.25 mm. long or less, glabrous within, except for the obviously glandular-pilosulous throat at the base of the galea, the limb obviously bilabiate, the upper 2 lobes united into a slightly bilobed galea 4 mm. long, this almost entirely maroon, the 2 lateral lobes broadly deltoid, ca. 3 mm. long and wide, broadly margined with maroon, the lower lobe narrower and relatively longer, all lobes sparsely hirsute without, glabrous within, the appendages inconspicuous, 1–2 mm. long, yellow throughout or dark maroon at base and yellow at apex, long-hirsute at apex; filaments united in a sheath ca. 2 mm. long at base, very slender, glabrous; anthers included, lightly connate but soon free, ca. 2.5 mm. long and broad, the cells somewhat separated by the thickened connective; ovary strongly white-villous; style slender, densely hirsutulous upwardly; stigma bilobed; disk reduced to a minute, dark, scarcely emarginate posterior gland.

Type in the U.S. National Herbarium (no. 1518165), collected at Umbría, Comisaria del Putumayo, Colombia, at 325 m. elevation, January–February 1931, by G. Klug (no. 2114).

Paratype: Colombia: Umbría, October–November 1930, *Klug* 1822 (US).

This species, the only one known from the Amazonian watershed, may be related to *T. illepida*, which has a corolla quite similar in shape and color, but lacks the numerous, small unicellular hairs and gland-tipped longer ones of *T. formosa*. The spathulate, entire calyx lobes are unique in this section.

4. Trichantha moorei (Morton) Morton, comb. nov.
Columnea moorei Morton, Baileya 7:55, *fig. 15.* 1959.

Stems succulent, scandent, at least 30 cm. long and probably much longer, unbranched (except probably at base), probably not radicant at the nodes, the internodes very short, about 1 cm. long, fleshy, glabrescent, minutely strigillose with 2-celled "bayonet"-shaped hairs and also with a few multicellular hairs toward the apex, bearing 2 pairs of conspicuous glands (these often coalescent in pairs) at each node between the leaves and just below the stipular line, the internodes short and regular, 10–12 mm. long; leaves thick-fleshy, dark green and shining above, light green beneath, obviously decussate, those of a pair equal, short-petiolate (the petiole 3 mm. long, 1 mm. thick, glabrate), the blades broadly elliptic, very uniform in size, 14–16 mm. long, 10–12 mm. wide, obtuse at base and apex, almost

entire but with one or two low broad inconspicuous crenations on each side, almost glabrous, bearing a few minute appressed hairs beneath especially on the midrib, the margins obviously ciliolate with several-celled hairs; flowers solitary in an axil, bibracteate, the bracts minute, linear, 1–2 mm. long, deciduous, pilosulous; peduncles arching, curved at apex, 3–4.5 cm. long, slender, 1 mm. thick at base, becoming enlarged and 2–3 mm. thick at apex, red, conspicuously long-setose-pilose, the hairs red, 2–3 mm. long, many-celled, spreading at right angles; calyx green, 5-parted, the lobes erect, equal, 12–15 mm. long, 8–11 mm. wide including the teeth, conspicuously and deeply pectinately parted, the central portion of the lobe lanceolate, about 3 mm. wide, the teeth 4–6 pairs, linear, spreading horizontally, the basal ones about 3–4 mm. long, the uppermost about 2 mm. long, all 0.8–1 mm. wide just above the base, conspicuously red-gland-tipped, the body and teeth externally conspicuously long-red-hirsute, the hairs 2–4 mm. long, many-celled, sharp-pointed, and also with a few, appressed, white, 2-celled, "bayonet"-shaped hairs, internally nearly glabrous but with a few stiff red hairs and also slightly glandular; corolla suberect in calyx, red (except the lobes), 5–5.5 cm. long, gibbous at the posterior base, the gibbosity 3 mm. wide, the tube 3–4 mm. wide just above the gibbosity, gradually enlarged upwardly but only slightly ventricose, 10–11 mm. wide near the apex, sparsely but conspicuously hirsute externally, the hairs 4–6 mm. long, red, many-celled, sharp-pointed, horizontally spreading, and also with minute spreading hairs, glabrous within except toward the throat, where conspicuously glandular-pilosulous, the throat only slightly contracted, the limb slightly bilabiate, the two upper lobes red, with narrow yellow margins, erect, partly connate, rounded, 4 mm. long, connate for about 2 mm., sparsely ciliolate, glabrous within at apex but strongly capitate-glandular lower down, the three lateral lobes clear yellow, not red-margined, slightly plicate at the angles between the lobes, erect, subequal, subdeltoid, about 5–6 mm. wide at the base and 5 mm. long, sparsely hirsute externally, more or less ciliate, glabrous within and not capitate-glandular, the appendages yellow, extremely minute and hardly observable in dried specimens; stamens attached to the corolla at the very base, the filaments pale yellowish-white, connate at the base for 4–5 mm., free upwardly, somewhat curved but not contorted, glabrous, the anthers slightly exserted, all four permanently connate, subquadrate, about 1 mm. long and wide, the cells oblong, fully dehiscent longitudinally, glabrous; staminodium none; ovary oblong in outline, 4–4.5 mm. long, densely white-sericeous; style white, straight, 5–5.5 cm. long, exserted, pilosulous; stigma bilobed; disk reduced to a solitary posterior gland, this white, thick, fleshy, not bilobed, ca. 1–1.5 mm. wide, 1.5–2 mm. long.

Type in the U.S. National Herbarium (no. 2216847), from material cultivated in the greenhouses of Bailey Hortorium, Ithaca, N.Y., collected by H. E. Moore, Jr., in 1958, originally received from an unspecified locality in Panama through Mr. Paul Arnold of the House of Plants, Binghamton, N.Y. This plant had been sent to Mr. Arnold by Mrs. Catherine B. Shepherd of Arlington, Va., who in turn received it from Mr. Martin S. Sawyer, of Gatun, Canal Zone. Another specimen has been received directly from Mr. Arnold.

5. Trichantha illepida (Moore) Morton, comb. nov.
Columnea illepida Moore, Baileya 8:56, *fig. 19*. 1960.

Stems stout, probably not radicant at the nodes, the internodes short, 1–2.5 cm. long, very stout, the upper ones ca. 3 mm. in diameter, somewhat zigzag, strongly ridged when dry, hirsute, the hairs spreading, yellow, multicellular, eglandular, 2–3 mm. long, borne on tubercles; leaves subdistichous, not bullate, those of a pair strongly unequal; larger leaves short-petiolate, the petiole 0.3–2 cm. long, hirsute, the blades variable in shape from ovate-lanceolate to oblanceolate, up to 13 cm. by 5 cm., acuminate or subcuspidate at apex, broadly cuneate and strongly unequal at base, minutely and remotely denticulate, green above, hirsute, the hairs colorless, several-celled, 1.5–2 mm. long, beneath green with conspicuous red blotches or red all over, septate-hirsutulous all over, with also a few, appressed, 2-celled, "bayonet"-shaped hairs, the lateral veins 5 or 6 (to 9?) pairs, slightly elevated on both sides; smaller leaves of a pair early deciduous, like the larger but subsessile, not over 2.5 cm. long; flowers several in an axil, slender pedicellate; bracts minute, ca. 4×0.75 mm., hirsute and with sessile yellow glands; peduncles red, 1 mm. thick or less, hirsute; calyx green, herbaceous, 1.5–2 cm. long, the lobes free, slightly unequal, the posterior shorter and narrower, the central portion 2.5–3.5 mm. wide, strongly pectinate-toothed, the teeth 4 or 5 (6) pairs on each side, linear, the larger 2 mm. long and 0.5 mm. wide, hirsutulous on both sides with colorless hairs, some long and many-celled, some short and 2-celled, both surfaces also with sessile yellow globular glands; corolla ca. 5 cm. long, slightly oblique in the calyx, slightly spurred at the posterior base, the tube dull, clear yellow, conspicuously striped with maroon from just below the middle to the base of the sinuses between the lobes, the stripes 0.5–1 mm. wide, the tube 7.5–10 mm. in diameter near the middle, slightly contracted in the throat, externally sparsely hirsute and provided also with some small spreading unicellular hairs, glabrous within except for the glandular-pilosulous throat, the limb bilabiate, ca. 15 mm. wide, the galea (posterior lip) 5.5–6 mm. high, bilobed, conspicuously spotted with maroon, the two lateral lobes deltoid, ca. 5 mm. long,

5–6 mm. wide at base, margined with maroon, the anterior lobe ca. 4.5 mm. long and 4 mm. wide at base, margined with maroon, all the lobes hirsute externally and with short, white, thick-based unicellular hairs also, the appendages yellow, inconspicuous when dry and not over 1 mm. long; stamens included; anthers quadrately connate; ovary green, pilose; style puberulous; stigma bilobed; disk reduced to a whitish, bilobed posterior gland.

Type: A cultivated specimen in the Bailey Hortorium, of unknown provenience.

Additional specimen examined: Cultivated: Fantastic Gardens, South Miami, Fla., Feb. 25, 1954, *R. G. Wilson*.

The specimen from Fantastic Gardens was determined as a new species by me in 1954. It was guessed to be either from Tingo Maria, Peru, or from the Panama Canal Zone. Later inquiries for more and better material brought the news that the plant had been lost. The plant that later turned up in the Bailey Hortorium without accession data was supposed to be from either Tingo Maria, Peru, or Ecuador. It is almost certainly from seeds or a plant sent from Fantastic Gardens to the Bailey Hortorium sometime around 1954, rather than a new introduction, as shown by the mention of Tingo Maria, Peru, in both cases. The determination of the real locality will have to await a collection of the species in the wild. The locality Tingo Maria is not likely, because no other species of *Trichantha* is known from Peru and because the climatic conditions in Tingo Maria are different from those where the other species grow. The Panama Canal Zone does not seem likely either, because this area has been well collected and it does not seem likely that this conspicuous plant would have been overlooked by others. The locality Ecuador is much more likely, but there seems no evidence in its favor.

This species does not show any close relationship with the others. It differs especially in its broader, toothed rather than dissected calyx lobes from *T. elegans*, *T. teuscheri*, and others.

6. Trichantha tropicalis Morton, sp. nov.

Caules elongati, radicantes, internodiis elongatis gracilibus hirsutis; folia per paria inaequalia, minora stipuliformia, majora magna, elliptica acriter acuminata basi rotundata remote denticulata, supra hirsuta, subtus viridia hirsuta et appresso-strigillosa; pedunculi penduli apice valde incrassati; calyx ruber dissectus, lobis lateralibus 2-vel 3-paribus linearibus rubro-hirsutis; corolla basi gibbosa, tubo rubro non lineato, apice superiore excepto, hirsuto, limbo bilabiato, galea atrorubra pallide marginata, lobis lateralibus flavis rubro-marginatis, lobo inferiore flavo basi rubro-maculato.

Stems ca. 40 cm. long, radicant at the nodes, the internodes 4–5 cm. long, reddish, rugose, slender, only 2.5 mm. in diameter near base, coarsely hirsute, the hairs persistent, borne on small tubercles, 7–9-celled, red, 4–5 mm. long; leaves of a pair strongly unequal; larger leaves short-petiolate, the petiole 8–10 mm. long, stout, 1–1.5 mm. in diameter, hirsute, the blades elliptic, 10×4.8 cm. to 14 ×5.2 cm., the apex sharply and rather abruptly long-acuminate, rounded and slightly unequal at base, herbaceous in texture, inconspicuously and remotely denticulate, uniformly hirsute above, the hairs ca. 5 mm. long, many-celled, hyaline, beneath paler green, similarly hirsute with elongate, spreading, dark, many-celled hairs with dark cross-partitions, and also with small (0.5 mm. long), appressed, 2-celled hairs, the basal cell small, yellow, the terminal cell elongate, white, sharp; smaller leaves of a pair early deciduous, short-petiolate, the blades lanceolate, not over ca. 1 cm. long and 3 mm. wide, hirsute like the larger leaves; flowers solitary or geminate; bracts deciduous; peduncles pendulous, 2.5–3.5 cm. long, ca. 1 mm. thick at base, strongly enlarged and 3 mm. thick at apex, densely red-hirsute; calyx red, the lobes free, slightly unequal, the 4 dorsal and lateral about 16 mm. long in flower, the posterior one shorter, ca. 14 mm. long, all deeply dissected, the central portion ca. 3 mm. wide at base, 0.3 mm. wide upwardly, with 2 or 3 pairs of linear lateral lobes, these 8–10 mm. long, 0.3 mm. wide, the central portion red-hirsute without and also with some inconspicuous, "bayonet"-shaped, white, appressed hairs, slightly strigillose within, hirsute at apex, bearing sessile yellow glands toward base, the lobes long-ciliate with red, several-celled spreading hairs; corolla ca. 5.5 cm. long, oblique in calyx, ca. 6 mm. wide at the conspicuously saccate base, the tube narrowed above base to 3 mm., the tube clear red nearly throughout, not striped except for 2 inconspicuous dark stripes near the apex, these running to the margins of the galea, becoming 7–8 mm. wide at the middle, sparingly reddish-septate-pilose externally, lacking small whitish unicellular hairs, glabrous within except in the glandular-pilosulous throat, slightly contracted in throat and 5.5–6 mm. wide, the limb bilabiate, the galea ca. 5 mm. long and 7 mm. wide, rounded and bilobed at apex, dark red with a paler border, the lateral lobes broadly deltoid, ca. 4 mm. long and 4 mm. wide at base, yellow in middle, with dark red margins, the posterior lobe 3.5 mm. long and 2.5 mm. wide, yellow with a dark red basal spot, the appendages conspicuous, yellow, 3–3.5 mm. long, 0.5 mm. thick, clavate, glabrous except the conspicuously red-pilose apex; filaments united at base into a sheath 1 cm. long, glabrous, extremely slender; anthers not exserted, borne near corolla throat, united into a square about 4 mm. long and wide; ovary

conic, sparsely white-sericeous; style slender, slightly pilosulous; disk reduced to a coarse, slightly bilobed, posterior gland.

Type in the U.S. National Herbarium (no. 2370203), collected in the San Juan de Micay Valley, Department of El Cauca, Colombia, at 100 m. elevation, Dec. 28, 1946, by Oscar Haught (no. 5406).

By its clear red, unlined corollas, and red, deeply dissected calyces related only to *T. clara*, which differs in the size, shape, and pubescence of the leaves.

7. Trichantha major Hook. Icon. Plant. 7: *t.667*. 1844.
Columnea major Hanst. Linnaea 36:388. 1865–6.

Stems 15–20 cm. back from the apex 3–4 mm. thick, the internodes elongate (9–12 cm.) or shorter (4.5 cm.), obviously hirsute with long (5 mm. long or more), many-celled pale-brown hairs, these numerous but still distant and not obscuring the surface; stems radicant, the adventitious roots thread-like, borne near the nodes; leaves of a pair strongly unequal; longer leaves petiolate, the petioles 6–13 mm. long, hirsute, the blades broadly elliptic, 6.5×4.5 cm. to 14×7cm., abruptly cuspidate at apex (ca. 1 cm.) rounded and strongly unequal at base, inconspicuously and remotely toothed upwardly, thin-herbaceous the upper surface not bullate, at maturity obviously foveolate, slightly paler beneath, strongly hirsute on both sides, the hairs 4.5 mm. long, many-celled, distant and not obscuring the leaf surface, "bayonet"-shaped hairs absent, the principal veins 4 to 6 pairs, strongly curved, obscure above, apparent and slightly raised beneath, the veinlets obscure; smaller leaves short-petiolate, the blades subrotund, about as wide as long, slightly cuspidate, mostly 1.5–2.5 cm. long, hirsute; flowers axillary, geminate (always?); bracts subulate, 5 mm. long, 0.5 mm. wide, hirsute, eglandular; peduncles 3–3.5 cm. long, apically thickened, long-hirsute, the hairs many-celled, with dark reddish cross-walls; calyx red, 2.5–3 cm. long, the lobes free, subequal, deeply laciniate, with the lobes ca. 3 cm. wide but the central lanceolate portion only 2–2.5 mm. wide, the lateral lobes 2 pairs, subequal, mostly ca. 1.5 cm. long, ca. 1 mm. wide at base, long-attenuate, the central lobe ca. 2 cm. long, strongly long-hirsute externally, and also strigillose with "bayonet"-shaped hairs, within hirsute toward apex and with sessile glands toward base; corolla erect in calyx, ca. 4.5 cm. long, yellow with conspicuous dark red or maroon vertical stripes running to the sinuses of the limb, tubular, scarcely ventricose, the tube becoming ca. 5.5 mm. wide about the middle, slightly long-hirsute externally, with also a few short, colorless, 1-celled, spreading hairs, hardly contracted in the throat, glandular-pilosulous within throat, the limb just slightly irregular, the lobes hirsute externally and with sessile glands, all dark colored, subrotund, 3–4 mm. long, entire,

not ciliate, the appendages yellow with dark apices, clavate, spreading, ca. 4 mm. long, long-hirsute at apex only; anthers barely exserted from the corolla tube, persistently connate, broadly oblong, ca. 1.5 mm. long, 0.9 mm. wide; ovary white-sericeous; style pilosulous; disk reduced to a bidentate, fleshy, glabrous posterior gland ca. 2 mm. high.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in Colombia by William Lobb (no. 117). No definite locality is given, but since the species has been twice collected in the region of Barbacoas and since Lobb is known to have collected there, it is likely that the type came from there.

Additional specimens examined: Colombia: Province of Barbacoas, Dept. of Nariño, 800 m. alt., *J. Triana* (US). Corregimiento Santander (Buenavista) to Barbacoas, vertiente del Río Telembí, Nariño, 840–200 m., Aug. 3–5, 1948, *H. Garcia-Barriga* 13176 (HNC).

8. Trichantha bullata Morton, sp. nov.

Caules elongati, internodiis elongatis; folia per paria inaequalia, minora lanceolata, majora elliptica, remote denticulata, supra bullata, valde hirsuta, subtus rubescentia, hirsuta et strigosa, basi inaequalia, apice acuminata; calycis lobi rubri, externe perspicue hirsuti, intus apice hirsuti, deorsum parce strigillosi, lobis valde pinnatisectis, lobulis lateralibus 4 vel 5 utrinque latere; corolla in tubo flava et atrobrunneo-rubro-lineata, lineis faucem non attingentibus, lobis paullo inaequalibus, flavis, rubro-marginatis, appendicibus validis, hirsutis.

Stems elongate, up to 2 m. long (sec. Lehmann), the internodes elongate, normally 7–12 cm. long, very slender, 2–3 mm. in diameter, dark red, shining, radicant at the nodes, usually somewhat zigzag, hollow, densely yellow-hirsute, the hairs 3–4 mm. long, spreading, coarse, borne on prominent tubercles, multiseptate (7–9-celled), the septae dark; leaves of a pair strongly unequal, the smaller ones often deciduous, thus making the leaves appear alternate; internodes elongate, those below the apex 7–9 cm. long; larger leaf-blades elliptic, 15×6 cm. to 6×2.3 cm. (uppermost), gradually and sharply acuminate, remotely denticulate, the base rounded, slightly unequal, above green, not foveolate, slightly bullate, strongly hirsute, the hairs borne on prominences, elongate, 3–4 mm. long, spreading, yellow with dark cross-walls, 7–9-celled, beneath green or usually reddish or deep dark red, not bullate or foveolate, strongly hirsute as upper surface, with some short "bayonet-hairs" intermixed, short-petiolate, the petiole red, 7–14 mm. long, thick, hirsute; smaller leaf of a pair narrowly lanceolate, not more than 3.5×1 cm., long-attenuate, the base cuneate, hirsute; flowers solitary or 2 to 4 in an axil; bracts subulate, minute, scarcely 5 mm. long, hirsute, deciduous;

peduncles 2.5–3.5 cm. long, exceptionally thick, long-red-hirsute; calyx 5-lobed to base, the lobes approximately equal, ca. 2.5 cm. long, deeply pinnately parted, the central portion linear-lanceolate, ca. 3 mm. wide at base, tapering gradually to the acute apex, the lateral lobes 4 or 5 on each side, linear, the lower about 13 mm. long, about 1 mm. wide at the base, gradually tapering to the acuminate apex, conspicuously hirsute without, the hairs very long (4–5 mm.). they (as well as the calyx lobes themselves) Bordeaux red when fresh (sec. Killip), violet-carmine when dry, simple, pluricellular, the cell wall obvious even to the naked eye, very numerous on the margins, and also strigose with "bayonet"-shaped hairs, within hirsute at apex, sparsely strigillose below; corolla ca. 6 cm. long, narrowly tubular, conspicuously saccate at the dorsal base, about 7 mm. wide at the base, 4.5 mm. wide above the saccate portion, gradually expanding clavately toward the apex and slightly curved toward the ventral side, reaching 10 mm. in diameter, slightly contracted at the throat (9 mm. wide), the total length of the corolla tube approximately 5.5 cm., the limb scarcely expanded, glandular-pilosulous within throat, not much wider than the tube, the three ventral lobes ovate or almost semicircular, obtuse, 4 mm. wide at base, 2.5 mm. long, the two dorsal united at base, bearing clavate or oblong appendages in the sinuses, these yellow with maroon apices, reflexed, about 2 mm. long and 1 mm. wide (the lowest ventral one narrower and longer, about 3 mm. long, when dry), the dorsal one borne on the back of the two united dorsal lobes, the tube externally densely pubescent with two kinds of hairs, some very short, few-celled, colorless, sharp-pointed, numerous all over the surface although not prominent on the saccate base, the others similar to the red calyx-hairs, confined to the upper half of the tube, extremely long and conspicuous toward the apex and especially on the appendages, the tube "citron-green" (sec. Killip) with broad stripes of burnt-lake, these often about 3 mm. wide or even more, stopping about 5 mm. below the throat except the broad one running to the middle of the galea, the lobes light cadmium-yellow margined with red, the appendages conspicuous clavate, ca. 2 mm. long, yellow with maroon apex, long-hirsute and also with numerous, sessile, yellow glands; filaments longer than the corolla but twisted and curved so as not to be exserted, very slender, ca. 0.2 mm. wide, didynamous, broadening toward the base, finally uniting with each other into a tube (broken on the dorsal side) about 6 mm. above the base, this tube becoming adnate to the corolla tube at about 1 mm. above the base; anthers borne about 5 mm. below corolla throat, glabrous, quadrately united, the four forming a rectangle 5 mm. high and 4 mm. wide, the cells parallel, not confluent, opening from base to apex, the connective square,

fleshy, glabrous; ovary oblong, 5 mm. long, conspicuously villous at apex, the hairs colorless, pluricellular; style ca. 5 cm. long, slightly exserted, flattened and about 1.5 mm. wide at the almost glabrous base, becoming narrower above and densely glandular-puberulous; stigma bilobed, bearing a few long, white, villous hairs; disk reduced to one large, transversely oblong, glabrous, unlobed, dorsal gland 1 mm. long and 1.5 mm. wide.

Type in the U.S. National Herbarium (no. 1142440), collected at "La Gallera," Micay Valley, Department of El Cauca, Colombia, at 1800–1900 m. elevation, July 1, 1922, by E. P. Killip (no. 7928). Isotype in the New York Botanical Garden.

Paratypes: Colombia: Near Río San Joaquin, "La Gallera," Micay Valley, Department of El Cauca, 1100–1300 m., *Killip* 7803 (NY). West Andes of Popayán, Department of El Cauca, 1200–1600 m., *Lehmann* 6000 (K, US). La Costa, near El Tambo, Department of El Cauca, 900–1200 m., *von Sneidern* 467, 622, 704 (all S).

This species, evidently confined to moist virgin forest of the Western Cordillera of the Department of El Cauca at middle elevations, is obviously related to *T. major*, which is still surely different in its minutely foveolate upper leaf-surfaces, its cuspidate rather than acuminate leaf-blades, its rotund rather than lanceloate smaller leaves of a pair, and its longer and more slender lobes of the calyx lobes.

9. Trichantha minor Hook. Icon. Plant. 7: *t. 666*. 1844. (But not Bot. Mag. Curtis: *t. 5428*. Cfr. *T. elegans*.)

Columnea minor Hanst. Linnaea 34:387. 1865–6.

Stems slender, not radicant (?), the internodes 3–3.5 cm. long, 2.5–3 mm. thick 20 cm. back from the tips, densely hirsute, the hairs more numerous, closer, shorter (ca. 3 mm.) than in *T. major*, mostly clearly antrorse rather than spreading; leaves of a pair unequal (?); larger leaves petiolate, the petiole 5–7 mm. long, antrorsely hirsute, the blades lanceolate, 3.5×1.2 to 5.5×2 cm., gradually acuminate at apex, broadly cuneate and oblique at base, inconspicuously and remotely denticulate, thick-herbaceous, glabrous above at maturity, except near the margins, these with numerous, conspicuous, 4–6-celled brownish ascending hairs 3 mm. long or more, dark-green above, paler beneath, reddish, inconspicuously strigillose with straight sharp 2-celled white hairs on the surface, antrorsely hirsute on the midrib and especially on the margins with straight, many-celled hairs, the veins about 6 pairs, inconspicuous above, slightly elevated beneath, the veinlets obscure on both sides; flowers axillary, solitary or geminate; bracts inconspicuous, linear, ca. 5 mm. long, hirsute and also with sessile glands; peduncles 1.5–2 cm. long, thickened toward apex,

strongly hirsute, the hairs spreading, slender, 3–4.5 mm. long, with red cross-walls; calyx red, 2–2.5 cm. long, deeply laciniate, the central undivided portion only 2–2.5 mm. wide, the lateral lobes 2 pairs, linear, 1.3–1.6 cm. long, 0.6–0.8 mm. wide, long-attenuate, hirsute on both sides and margins and also bearing some appressed minute sharp white 2-celled hairs; corolla erect in calyx, ca. 4 cm. long, tubular, hirsute externally with long many-celled hairs and also short-pilosulous with spreading, unicellular hairs, the tube somewhat ventricose, becoming 8 mm. wide at the middle, slightly contracted in the throat, probably glandular-pilosulous within at base of galea, the limb slightly bilabiate, the galea 5 mm. long, dark red, the other 3 lobes 3 mm. long, probably yellow, the appendages clavate, ca. 3.5 mm. long, ca. 0.8 mm. thick, long-hirsute at apex.

Type in the herbarium of the Royal Botanic Garden, Kew, collected by William Lobb (no. 175). According to Killip (Smiths Misc. Coll. 87(1): 5. 1932) no. 175 was collected at "Barbacosa," Colombia, which is undoubtedly a slip for Barbacoas, in the Department of Nariño, Colombia.

Additional collections examined: Colombia: Alto de Armada, Department of Nariño, 1458 m. alt., May 22, 1876, *E. André* K 36 (K, NY, US). The ability to place this locality in Nariño is due to the kindness of Dr. L. B. Smith in making available his unpublished paper on André's itinerary.

The character of having the leaves entirely glabrous on the upper surface except at the margins easily separates *T. minor* from other species with which it might be confused, e.g. *T. elegans* or *T. teuscheri*.

A confusion is introduced by the plant illustrated in Curtis' Botanical Magazine plate 5428 as *T. minor*. A specimen authenticating the plate is preserved in the herbarium at Kew, mounted on the same sheet as the type of *T. minor;* it was received from the Veitch Nursery in April 1864, just at the time the plant was illustrated. Although this plant is similar to *T. minor*, it cannot really be the same, differing in the size and pubescence of the calyx, the coloration of the corolla limb and the pubescence of the upper leaf surface. This horticultural specimen, of unknown provenience, belongs to the species here described as *T. elegans*.

10. Trichantha clara Morton, sp. nov.

Caules radicantes, penduli, tenues, parce hirsuti; folia per paria inaequalia, minora stipuliformia, majora lanceolata vel oblongo-lanceolata, supra medium denticulata, supra parce hirsuta, subtus strigosa; calyces rubri, lobis alte laciniatis, lobulis lateralibus 2-paribus, externe rubro-hirsuti et etiam strigosi, intus apice parce hirsuti basi glabri parce glandulosi; corolla rubra, non lineata, limbo

paullo bilabiato, lobis 3 inferioribus rubris marginibus angustis flavescentibus, 2 superioribus basi maculam atrem externe gerentibus, appendicibus perspicuis rubris.

Stems radicant at the nodes, the terminal branchlets pendulous, slender, sometimes flexuous, the internodes short (1.5 cm.) or usually longer (up to 6 cm.), ca. 2 mm. thick 20 cm. below tip, reddish, sparsely hirsute, the hairs stiff, antrorse, ca. 4.5 mm. long, many-celled; leaves of a pair strongly unequal; larger leaves short-petiolate (ca. 5 mm.), the blades lanceolate to oblong-lanceolate, 4.5×1.5 cm. to 5.7×2.7 cm., gradually and sharply acuminate at apex, oblique at base and broadly cuneate to subrounded, remotely but sharply toothed above the middle, the minute teeth recurved in drying and visible only from the lower side of the leaves, light green above, the surface not foveolate, sparsely long-hirsute all over, paler and sometimes reddish beneath, sparsely strigose, the hairs stiff, appressed, 2-celled, the basal cell short, dark-colored, the terminal cell white, bayonet-shaped, the veins 4 or 5 pairs, arcuate, obscure above, very slightly prominulous beneath, the veinlets obscure on both sides; smaller leaves stipule-like, 5–14 mm. long, ovate to linear-lanceolate, with pubescence above and beneath like the larger leaves; flowers geminate, borne in the axils of the larger leaves; bracts 2, minute, hirsute, eglandular, deciduous, linear, ca. 5×0.5 mm.; peduncles slender, 2–2.5 cm. long, thickened toward apex, long-red-hirsute, the hairs slender, widely spreading, many-celled, 3.5–4.5 mm. long; calyx red, ca. 15 mm. long, the whole calyx with the lobes ca. 2 cm. wide, the 5 lobes free, deeply laciniate, the central portion ca. 1.5 mm. wide, the lateral lobes (2 pairs) subulate, 9–10 mm. long, 0.4–0.5 mm. wide, conspicuously long-red-hirsute, and also sparingly strigose like the lower surface of the leaves with white, bayonet-shaped hairs, glabrous within (except at the hirsute apex), and with a few, sessile glands at base; corolla all clear red, without stripes, erect in calyx, 4.5–5.5 cm. long, slightly saccate at posterior base, 3 mm. wide just above base, ventricose upwardly, becoming 8 mm. wide above middle, slightly contracted in throat, where 6 mm. wide, externally long-hirsute with many-celled, red, flaccid hairs with dark cross walls, also a few small, spreading sharp-pointed, 2-celled hairs, the limb slightly bilabiate, the two upper lobes partly connate, 2–2.5 mm. long, red with a dark spot at base externally, glandular-pilosulous at base, the three lower ca. 1.5 mm. long, clear red, with narrow, yellowish margins, the appendages conspicuous, clavate, red, 3–4 mm. long, 1 mm. thick at apex, apically long-hirsute; filaments connate at base for 5 mm. or more, glabrous; anthers perhaps exserted briefly, but normally borne about medially in the tube by curling of the filaments, connate at first but finally free, broader than long, ca. 1.5 mm. long

and 2 mm. wide, the cells contiguous but separated by a fleshy connective; style minutely glandular-pilosulous; stigma 2-parted, pilosulous; ovary white-sericeous; disk reduced to a small posterior gland, this dark colored, inconspicuously 2-lobed, ca. 1 mm. long.

Type in the U.S. National Herbarium (no. 1853860), collected at Piedra de Moler, Hoya del Río Digua, Cordillera Occidental, Department of El Valle, Colombia, at 900–1180 m. elevation, Aug. 19–28, 1943, by J. Cuatrecasas (no. 14922).

Paratypes: Colombia: La Elsa, Hoya del Río Digua, Dept. of El Valle, 1000–1200 m. alt., Nov. 9, 1943, "enredadera herbácea; ramas purpureas; hoja hérbaceo crasa, verde en el haz, gris clara en el envés; pedúnculo cárdeno; caliz con pelos cárdenos; corola cárdena," *Cuatrecasas* 15312 (US). Between La Oreja and Quibdó, Intendencia del Chocó, Apr. 1, 2, 1931, *Archer* 1687, 1688 (US). La Costa, near El Tambo, Dept. of El Cauca, 1000–1400 m. alt., 1935–1936, *von Sneidern* 469, 497, 498 (S).

A species of wider distribution than most, probably being not uncommon in its special, undisturbed habitats.

11. Trichantha teuscheri Morton, sp. nov.

Planta epiphytica, caulibus elongatis vix ramosis, leviter rubro-hirsutis; folia per paria valde inaequalia, minora saepe stipuliformia, majora lamina lanceolato-elliptica, longe acuminata, basi vix obliqua, remote denticulata, supra hirsuta, subtus viridi vel rubro-tincta, septato-hirsuta, pilis unicellularibus nullis; flores penduli, longe pedunculati, pedunculo valde rubro-hirsuto; calycis lobi dissecti, parte centrali lineari-lanceolati externe rubro-hirsuti et parce strigillosi, intus basi glandulosi, lobis lateralibus 2-vel 3-paribus linearibus utrinque hirsutis; corolla tubulosa late rubro-lineata, vix flavo-lineata, lineis flavis angustissimis, externe hirsuta, intus in fauce glanduloso-pilosula, limbo bilabiato, lobis superioribus in galea rubra connatis, lobis lateralibus et inferioribus flavis, appendicibus flavis conspicuis apice hirsutis; stylus apice glanduloso-pilosulus.

Stems elongate, 70 cm. long or more, the internodes elongate, 3–6.5 cm. long, very slender, ca. 1.5 mm. in diameter, red, sparsely but conspicuously red-hirsute, the hairs spreading, 1–2 mm. long, several-celled, the lateral walls pale rosy, the cross-partitions dark red; leaves of a pair strongly unequal; larger leaves petiolate, the petiole 6–13 mm. long, slender, ca. 0.8 mm. in diameter, hirsute like the stems, the blades lance-elliptic, mostly ca. 5×2 cm., the largest 8.5×3.7 cm. varying to 9×2.7 cm., the apex gradually or rather abruptly long-sharp-acuminate, the base broadly cuneate or slightly rounded, only slightly unequal at base, herbaceous in texture, the margins remotely and minutely denticulate, above dark green, not bullate or foveolate,

conspicuously hirsute, the hairs spreading, yellowish, 2–5 celled, 1–2 mm. long, beneath green with red veins or more or less suffused with red all over, deciduously hirsute, the hairs yellowish (or reddish along the veins), several-celled, 1–2 mm. long, and also with a few small, white appressed "bayonet"-shaped hairs, the lateral veins 5 or 6 pairs, obscure above, slightly raised beneath; smaller leaves of a pair often minute and stipule-like, 5 mm. long or less or sometimes larger and up to 3 cm. long by 11 mm. wide, on petioles ca. 5 mm. long; flowers solitary or commonly 2 or 3 in an axil; bracts minute, subulate, 1.5–2 mm. long, hirsute, and also yellow-glandular; peduncles 2–3 cm. long, curved, red-hirsute, conspicuously thickened toward apex; calyx 5-lobed nearly to base, the lobes 16–18 mm. long, red, deeply dissected, the central portion linear-lanceolate, 2.5–3 mm. broad at base, attenuate and only 0.5 mm. wide at apex, conspicuously red-hirsute externally, the hairs spreading, many-celled, 2–3 mm. long, with red lateral walls and dark red cross-partitions, and also with a few appressed "bayonet"-shaped hairs, not hairy within but at base densely glandular, the glands globular, yellow, sessile, the lateral lobes 2 or 3 pairs, linear, 4.5–6.5 mm. long, ca. 0.5 mm. wide, conspicuously red-hirsute on both sides; corolla pendulous, 4–4.5 cm. long, 4 mm. wide at base, 7 mm. wide in saccate portion above base, then narrowed to 3.5 mm., the tube slightly ventricose, becoming 7–8 mm. wide about the middle, gradually narrowed to 5 mm. in throat, dark red with very slender and inconspicuous yellow lines running to the base of the middle of the lobes, the yellow areas broader toward base of corolla tube, hirsute externally, the hairs spreading, rather sparse, ca. 2 mm. long, several-celled, colorless, with colorless cross-partitions, eglandular, small unicellular hairs present but few, glabrous within except for the densely glandular-pilosulous throat, the limb bilabiate, the 2 upper lobes united into an emarginate galea, this ca. 4 mm. long and 6–7 mm. wide, dark red, glandular-pilosulous at base, the lateral lobes all yellow, deltoid, ca. 3 mm. long and 4 mm. wide at base, the lower lobe yellow elliptic, ca. 4 mm. long and 2.5 mm. wide, the appendages yellow, conspicuous, ca. 4 mm. long, clavate, ca. 1 mm. wide at apex, conspicuously hirsute at apex, the hairs colorless or slightly tinged with red; filaments united into a sheath ca. 7 mm. high at base, slender, glabrous; anthers lightly connate at first, soon free, 1.5 mm. long, 2 mm. wide, the connective prominent, dark; ovary conic, puberulous at base, lightly white-sericeous at apex; style ca. 3.8 cm. long, sparsely pilosulous at base with unicellular hairs, at apex glandular-pilosulous, the hairs several-celled; stigma conspicuously bilobed; disk reduced to a bilobed thick fleshy glabrous posterior gland ca. 2 mm. high and wide; fruit a globular, white berry 1 cm. in diameter (sec. Teuscher).

Type in the U.S. National Herbarium (no. 2370201), collected in the Montreal Botanical Garden, by M. Raymond and M. Gougeon (no. 2135–56), from material originally collected by Henry Teuscher in Ecuador in a wet moss-covered forest at an altitude of ca. 3400 ft. near the road from Cuenca to Quayaquil, on the Pacific slope of the Andes, about 20 to 25 road-miles beyond Ducur coming from Cuenca in the spring of 1956.

Paratypes: All grown from cuttings of the type plant in the Montreal Botanical Garden: Bailey Hortorium, June 1959, *Moore* 7745 (US); University of California Botanical Garden, July 27, 1959, *Hutchison* (U.C. 58. 263).

This plant has been identified erroneously with *Trichantha minor*, under which name it is well illustrated in the Delectus Seminum et Sporarum, no. 22, 1957–58, of the Montreal Botanical Garden (frontispiece). An article concerning its discovery and characteristics was published by Henry Teuscher in the National Horticultural Magazine (vol. 37, no. 3, pp. 172–174. July 1958), along with a full-page illustration of the plant in fruit. Another mention is by Paul Arnold in an article entitled "American Gesneriad Reintroduced from Canada" (Gesneriad Journal, vol. 7, no. 2, p. 3. 1959).

Mr. Raymond submitted a specimen to me in 1957 of Mr. Teuscher's plant, asking about the determination as *Trichantha minor*, but I was unable to verify it, in the absence of the type or any authentically named material or even of any detailed and adequate description. I now have the holotype of *T. minor* before me, kindly sent on loan from Kew, and it shows a related but obviously different species. The two can be distinguished as follows:

Leaf-blades glabrous above except at the margins, beneath sparingly strigillose on the surface with appressed minute (0.5–0.6 mm. long), 2-celled, white sharp hairs, the midrib appressed-pilose with long, many-celled hairs; calyx large, more than 2 cm. long, the lobes externally with some minute appressed white hairs as well as long, many-celled hairs . . . . . **T. minor**

Leaf-blades hirsute all over above, hirsute beneath, minute, white, 2-celled hairs few or absent; calyx 1.6–1.8 cm. long, or sometimes smaller, hirsute, lacking minute, white hairs . . . . . **T. teuscheri**

12. Trichantha elegans Rose, sp. nov.

Caules graciles, rubescentes, internodiis brevibus dense rubro-hirsutis, pilis tenuibus; folia per paria inaequalia, minora saepe stipuliformia, majora elliptica vel ovato-elliptica, acuminata, basi rotundata et obliqua, supra hirsuta, subtus parce strigillosa; calyces mediocres, roseo-rubri, lobis valde laciniatis, laciniis lateralibus 2-paribus, linearibus, externe rubro-hirsutis; corolla in tubo late purpureo-rubro-lineata, anguste flavo-lineata, faucem versus flava, limbo

flavo, non lineato, viridi-marginato, appendicibus magnis flavis clavatis hirsutis.

Small succulent epiphytic herb, the stems radicant at the nodes, little branched, the internodes short (1.5 cm.) or moderately elongate (to 4 cm.), somewhat zigzag, 2 mm. thick or less 10 cm. back of the apex, densely hirsute, the hairs 3–4 mm. long, red, flaccid, many-celled, and also strigose with appressed, bayonet-shaped 2-celled hairs, the basal cell small, red, the apical white, sharp-pointed; leaves of a pair strongly unequal; larger leaves short-petiolate, the petiole 3–4 mm. long, densely hirsute, the blades elliptic, or ovate-elliptic, 2.8×1.2 to 8×3.5 cm., gradually and sharply acuminate, rounded and oblique at base, inconspicuously and remotely toothed, light green above, the surface not foveolate, long-hirsute, the hairs colorless, flaccid, many-celled, beneath paler and reddish, sparingly and inconspicuously strigose, the hairs bayonet-shaped, appressed, 2-celled, the basal cell short, the apical cell elongate, white, sharp-pointed, with longer, several-celled, straight, yellowish hairs along the midrib and sometimes principal veins, the veins 4 or 5 pairs, not prominent above, obvious and very slightly elevated beneath, strongly red-colored along the veins, the veinlets obscure on both surfaces; smaller leaves mostly stipule-like and not over 8 or 9 mm. long, but occasionally better developed and almost half as long as the larger, similarly pubescent; flowers geminate in the axils of the larger leaves; bracts minute, linear, densely hirsute; peduncles 1.8–2.3 cm. long, densely hirsute, and also antrorsely strigose with bayonet-shaped hairs like those of the lower leaf surfaces; calyx all dark rose-red, ca. 2 cm. long and wide (incl. the lobes), 5-parted to the base, the sepals deeply laciniate, the central portion 2.5–3 mm. wide, the lateral lobes 2 pairs, linear, 8–11 mm. long, 0.5–0.6 mm. wide, externally strongly red-hirsute, and also with white, appressed, "bayonet"-shaped hairs, within sparsely hirsute and also slightly strigose with "bayonet"-shaped hairs; corolla 3–4 cm. long, erect in calyx, rose-red at base, with broad dark purplish-red stripes upwardly running toward the sinuses of the lobes but stopping short of them, and narrow yellow lines, the yellow becoming general toward the throat, the tube 4 mm. wide at base, ventricose upwardly and becoming 7–8 mm. wide at middle, obviously long-hirsute, and bearing also minute, spreading, acute, 1-celled hairs and globular sessile yellow glands, slightly contracted to throat, this with numerous glandular hairs within at the base of the galea, this ca. 6 mm. wide, the limb yellow with greenish margins, slightly irregular, 2 lobes ca. 3 mm. long, 3 lobes ca. 2 mm. long, the appendages yellow, obvious, clavate, 2.5–3 mm. long, long-hirsute apically; filaments long-connate at base, glabrous; anthers barely exserted from the corolla tube at anthesis, connate, eventually

free, quadrate, ca. 1.6 mm. long and 2 mm. wide, the cells not contiguous, separated by the enlarged connective; style glandular-pilosulous; stigma obviously bilobed; ovary white-sericeous; disk reduced to a dark-colored, glabrous, truncate, entire posterior gland ca. 1.5 mm. high.

Type in the U.S. National Herbarium (no. 2370202), collected on the road between Quito and Santo Domingo, Province of Pichincha, Ecuador, at 1300 m. elevation, Apr. 3, 1942, by Oscar Haught (no. 3215). Portion of holotype deposited in the herbarium of the New York Botanical Garden.

Paratypes: Ecuador: Vicinity of Ayabamba,[4] Province of El Oro, Oct. 15, 16, 1918, *Rose & Rose* 23462 (NY, US). Rich, moist luxuriant forest along trail from Sambotambo, following headwaters of Río Moro Moro, south to Buenaventura at and along highway to Portovelo, Province of El Oro, 1035–1800 m. alt., Aug. 29, 1943, "pendent epiphyte from branches; leaves subcoriaceous, dark dull green above with sulcate midrib, pale gray green below with lavender nerves; pedicels and calyx deep rose; corolla purple, the lobes with yellow appendages and green tips, their margins covered with rose-colored hairs," *Steyermark* 54202 (US). Dense rich jungle between Río Blanco and Río Norcay, on road between Chacanceo and Molleturo, Province of Azuay, at 1520 m. alt., June 4, 1943, "pendent epiphyte; calyx rose-orchid; corolla tube purple for ¾ part, then greenish-yellow for upper ⅓, the appendages on corolla lobes yellow; leaves silvery green, below suffused with lavender," *Steyermark* 52820 (F, US). Another, slightly doubtful, collection is *Lehmann* K 273 (K), without locality; the sheet bears a penciled word which may be "Guechi," "Gueshi," or "Guesbi," but it is uncertain if this is a common name or a locality.

As indicated above in the discussion under *T. minor*, this is the species illustrated in Curtis' Botanical Magazine *t. 5428* (1864) as *T. minor*.

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[4] Ayapamba on the label, but this is an error, as shown by Rose's field notebook.

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STUDIES OF FERN TYPES, I

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In 1934 Carl Christensen, in his Index Filicum, Supplement III, gave the number of recognized species of ferns as 9,387, which today must be considered a conservative estimate. The new fourth supplement to the Index Filicum (1965) does not indicate the number of new species cited, but it must be well in excess of 1,000. Most of the well-known older species have numerous specific synonyms or reputed synonyms. I would guess at present that the number of species of ferns is in excess of 15,000. The Index does not list the subspecies, varieties, or forms, and not all the hybrids. I should thus estimate that more than 50,000 entities have been described in the ferns, and there are therefore a corresponding number of types.

Needless to say, the earlier botanists did not work with a concept of types in mind. A number of American workers began using the terms "type" and "cotype" (which usually meant a duplicate of the type, i.e., the present isotype) about 1900, and German fern students used "Typus" or "Original" similarly, but the formal recognition of types in the International Rules of Nomenclature did not begin until the International Botanical Congress in Cambridge in 1930. Since that time, succeeding Congresses have clarified the concepts of types, and the designation of a nomenclatural type has been mandatory since January 1, 1958.

When original descriptions are based on a single collection, naturally there is no problem as to the type, but when descriptions are based on several collections, i.e., syntypes, as is of course frequently the case, it is necessary according to the Code to designate one of the syntypes as the lectotype. This should not be done routinely, but only after a study of the taxonomy and nomenclature of the group involved. However, it is sometimes not practicable to study all of the syntypes involved; in some such cases one may be obliged to designate a lectotype, making sure that the specimen chosen agrees with the original description. As is well recognized, collections bearing the same number may be mixtures, and so each specimen must be carefully scrutinized. Duplicates of the holotype are officially designated as isotypes by the Code. No name is ascribed to duplicates

of the syntypes; the term "isosyntype" is here used;[1] although the meaning is readily evident by analogy, this term could appropriately be added to the section of the Code dealing with the nomenclature of types.

The majority of the estimated 50,000 fern names have never been properly typified by the current rules, and in fact many of the types of the older species have never been studied. Even the fern specimens in the Linnaean Herbarium in London have never been studied by an expert pteridologist, identified with current collections, or properly annotated. The types at the Royal Botanic Gardens, Kew, are partially indicated and segregated, especially those of Hooker and Baker, and some of the types in Berlin were indicated by Hieronymus, but in most herbaria the types remain unmarked, except in the case of recently described species.

In 1954, I was privileged to receive a grant from the John Simon Guggenheim Memorial Foundation to study fern types in various herbaria in Europe for a period of seven months. During this time through the courtesy of the various directors and curators I studied and photographed 8,011 fern types, mostly in Muséum National d'Histoire Naturelle, Paris, the Rijksherbarium, Leiden, and the British Museum (Natural History), London, although I visited briefly the Jardin Botanique de l'Etat, Brussels, the Conservatoire et Jardin botaniques, Genève, the Staatsinstitut für allgemeine Botanik, Hamburg, the Botanical Museum, Copenhagen, the Riksmuseet, Stockholm, the Botanisk Museum, Oslo, and the Royal Botanic Gardens, Kew. In subsequent years, under the auspices of the Smithsonian Institution, I visited Europe several times and photographed additional types in some of the herbaria mentioned above, and also in the Botanischer Garten, Zurich, the Botanisches Museum, Berlin-Dahlem, and the Royal Botanic Garden, Edinburgh. The total number of type photographs is now 13,011, but not all of these have been labeled and studied.

In 1957, I applied for and received a grant from the National Science Foundation (Grant G4080) amounting to $14,900 for the purpose of having duplicate prints made of the original 8,011 photographs that I had taken in 1954, and to have labels typed for these. Altogether more than 40,000 prints were made, which are being distributed to various institutions throughout the world as they are worked over and labeled. The money from this grant having been exhausted, I applied for and received a continuation from the National Science Foundation

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[1] Because of the numerous mixed collections some botanists have had so little faith in the authenticity of duplicate syntypes that they have referred to them jokingly as "arithmotypes."

(Grant GB–1243) for the amount of $5,750. The work of label typing is still going on.

The study of the original types, on which I made many notes, and of the photographs has served to clarify the status of many names. The types show that some species have been wrongly interpreted, having been recognized as distinct when they are actually synonyms, or vice versa. Others have been essentially relegated to the status of "species dubiae," although the types prove to be readily identifiable. Ultimately the number of described species that will permanently remain dubious is bound to be very small after all the herbaria have been combed for types, a task that will occupy fern students for a great many years. Identifying some of the old types will require experts to decipher cryptic marks on the labels and sheets, to identify old handwritings, watermarks of the old paper, and so forth. However, the locating of most types does not require quite these fine details.

The following notes are the first of a projected series discussing some of the more interesting types, especially those that involve some change in the current interpretations of the species involved. It is regrettable that the study of types should result in some changes in the specific epithets of some well-known plants, but this is inevitable. It is caused partly by the brief and inadequate descriptions of many early (especially but not exclusively) writers, and by the unwillingness of some later workers to attempt to locate and place the types of earlier writers. Although such changes are bound to be numerous they are not limitless. Ultimately a more stable nomenclature will result, although there will always be plenty of divergence of opinion when it comes to such (essentially subjective) taxonomic matters as the delimitation of genera and broad or narrow specific concepts.

The present work follows the precedent-setting work of the late C. A. Weatherby on the fern types described by Desvaux.[2] The original names are listed alphabetically, each followed by the correct name, according to the present Code of Botanical Nomenclature and according to the taxonomic system that I follow, which is essentially that of Christensen.[3]

1. ACROSTICHUM ACUMINATUM Willd. *in* L. Sp. Pl. ed. 4, 5:116. 1810=**Photinopteris acuminata** (Willd.) Morton, comb. nov.
Lomaria speciosa Blume, Enum. Pl. Jav. 202. 1828. Type: Java, *Blume*.
Photinopteris simplex J. Smith, London Journ. Bot. 3:403. 1841. Nomen nudum. Based on *Cuming* 64, from Luzon, Philippine Islands.

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[2] "On the types of Desvaux's American species of ferns," Contr. Gray Herb. CXIV:13–35. 1936; and "On certain type specimens in ferns," Contr. Gray Herb. CXXIV:13–22. 1939.

[3] In the Index Filicum, Suppl. III, and *in* Verdoorn, Manual of Pteridology.

Photinopteris horsfieldii J. Smith [London Journ. Bot. 3:403. 1841, nomen nudum] ex Hook. & Bauer, Gen. Fil. *t. 92*. 1842. Syntypes: Singapore, *Wallich*; Java, *Horsfield*; Luzon, *Cuming* 362.[4] In consideration of the specific epithet chosen, I select the Horsfield specimen as lectotype; it is presumably at Kew.

?*Photinopteris cumingii* Presl, Epim. Bot. 192. 1849 [1851]. Type: Mindoro, Philippine Islands, *Cuming* 362 p.p., presumably in Prague. Presl considered *Cuming* 362 a mixture, the other part being *P. horsfieldii*.

Photinopteris humboldtii Presl, Epim. Bot. 192. 1849 [1851]. Based on *Acrostichum acuminatum* Willd. An illegitimate change of specific epithet.

Photinopteris speciosa Presl, Epim. Bot. 264. 1849 [1851].

Acrostichum rigidum Wallich ex Hook. Sp. Fil. 5:281. 1864. An illegitimate change of specific epithet. Cited as synonyms are *Lomaria speciosa* Blume, *Photinopteris simplex* J. Smith, and *P. horsfieldii* J. Smith. It is to be considered as a renaming of *L. speciosa* Blume, with the same type. The Wallich name presumably appears on the sheet that was one of the syntypes of *P. horsfieldii*.

TYPE: Herb. Willdenow 19539 (B), photograph (by R. M. Tryon) US, labeled as Peru, Malaspina Expedition.

Willdenow based his *Acrostichum acuminatum* on a sterile specimen collected by the Malaspina Expedition and on the *Lingua cervina scandens citri foliis major* of Plumier (*t. 115*), from Martinique. The actual specimen studied and described by Willdenow should be given precedence as the type over the citation of a pre-Linnaean plate, just as most Swartz species of ferns were based on actual specimens, some of which were identified with plates by Plumier. The specimen in the Willdenow Herbarium is clearly *Photinopteris speciosa*. Presl renamed it *Photinopteris humboldtii*, probably going chiefly on the very different locality "Peru," stated on the sheet, but it is clear that this is a wrong locality. Many of the plants of the Malaspina Expedition (collected by Nee or Haenke) were wrongly localized as Peru or Ecuador when they really came from the Philippine Islands, as this one doubtless did. The characteristic genus *Photinopteris* is not uncommon in the Philippine Islands, but has never been found in Peru, or indeed in any place in the New World. The earliest name for this species is *Acrostichum acuminatum* Willd., and so the above new combination *P. acuminata* is needed. The different species *Acrostichum acuminatum* Poiret is also 1810, but Poiret's publication is later than Willdenow's, according to recent studies by Dr. William Stearn.

2. ACROSTICHUM LANCIFOLIUM Desvaux, Gesell. Naturf. Freund. Berlin Mag. 5:310. 1811 = **Elaphoglossum lancifolium** (Desvaux) Morton, comb. nov.

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[4] A specimen at Geneva (Morton photographs 3873, 3874) labeled "*Cuming* 352" is an error of transcription, for Cuming collected this species only once, his number 362. This sheet gives the locality as Mindoro, although Hooker and Bauer give the locality as Luzon.

Acrostichum salicifolium Willd. ex Kaulf. Enum. Fil. 58. 1824. Type: Bourbon [Réunion], *Desfontaines.*
Elaphoglossum salicifolium (Willd. ex Kaulf.) Alston, *in* Exell, Cat. Vasc. Pl. San Thomé 92. 1944.

The type of *A. lancifolium* Desv. came from Mauritius according to the original description, but the type specimen (Herb. Jussieu Cat. 1004, Morton photograph 2887) is marked "Ile de France [i.e., Mauritius] et du Bourbon [i.e., Réunion]." It was received from du Petit Thouars. The species does occur both in Mauritius and Réunion, and also in Madagascar. In the recent treatment of the ferns of Madagascar, Madame Tardieu-Blot continues to use the name *E. salicifolium*, but the epithet *lancifolium* has priority, and there appears to be no obstacle to its use.

3. ADIANTUM ACUMINATUM Desv. Ges. Naturf. Freund. Mag. Berlin 5:327. 1811=**Adiantum tetraphyllum** Humb. & Bonpl. ex Willd. *in* L. Sp. Pl., ed. 4, 5:441. 1810.
TYPE: Puerto Rico, *Ledru* (P, photograph by Weatherby, US).

Weatherby in his study of the fern types of Desvaux did not place *A. acuminatum* Desv. In the Index Filicum it is placed as a synonym of *A. villosum* L., but the type shows that it is a rather common form of *A. tetraphyllum* Humb. & Bonpl. as it occurs in Puerto Rico. The segments are obtuse, and so it may be presumed to be the form described as *A. tetraphyllum* f. *obtusa* Kuhn.[5] However, since Kuhn did not cite a type or any specimens of his forma, a lectotype will have to be selected from material in Berlin that has been identified as f. *obtusa* by Kuhn, which is presumably not the same as *A. tetraphyllum* var. *obtusum* Mett. ex Fourn. Mex. Pl. 129. 1872, a synonym of *A. pulverulentum.*

4. ADIANTUM POLITUM Humb. & Bonpl. ex Willd. *in* L. Sp. Pl. ed. 4, 5:442. 1810=**Adiantum polyphyllum** Willd. var. **politum** (Humb. & Bonpl.) Morton, comb. nov.
TYPE: Cumana, Venezuela, *Humboldt & Bonpland* (Herb. Willd. no. 20083–1, photograph Tryon, US). A second sheet in Herb. Willdenow (20083–2) was originally in folder 20085 (*A. villosum* L.) but has been reidentified as *A. politum;* it appears identical with the holotype of *A. politum,* and is doubtless a part of the same collection.

In the Index Filicum *A. politum* is listed as a dubious species. A study of the photograph of the type shows that it is closely allied to *A. polyphyllum* Willd. (type: Caracas, *Bredemeyer,* Herb. Willd. 20104–1, photograph Tryon, US), which is fully quadripinnate, or in some collections even 5-pinnate at base. The frond is merely tripinnate in *A. politum;* this may not be a fundamental distinction, but

[5] Jahrb. Bot. Gart. Berlin 1:342. 1881.

still I have not seen any specimens to match it, and so it may rank as a variety. Dr. Maxon studied the type in Berlin in 1930 and wrote: "It is a delicate plant of the *polyphyllum* alliance and looks like *A. pectinatum* Fée, with very small sori." However, it is doubtful if there is any relationship at all with *A. pectinatum*, which is somewhat similar in the division of the blade but which differs strongly in having pubescent rhachises and rhachillas; in *A. politum* (and *A. polyphyllum*) these are wholly glabrous, dark purple, smooth, and shining. A synonym of *A. polyphyllum* var. *polyphyllum* is *A. cardiochlaena* Kunze,[6] judging from the description and the comments by Kunze.

5. Adiantum schaffneri Fourn. Bull. Soc. Bot. France 27: 328. 1880= **A. capillus-veneris** L. (forma).

Type: "In montibus ca. San Luis de Potosí," Mexico, October 1877, *Schaffner* 64 (holotype P, Morton photograph 2623).

The original description is as follows:

L'envoi de M. Schaffner contient encore plusieurs espèces que je crois nouvelles, et sur lesquelles j'aurai l'occasion de revenir. Ce sont:

1. L'*Adiantum Schaffneri* (no. 64).—J'ai envoyé, il y a plusieurs mois, cette plante à M. Bommer, qui prépare une monographie du genre *Adiantum:* je regrette de n'avoir pas reçu de réponse de ce savant; mais je ne voudrais pas la décrire, de crainte de surcharger la nomenclature d'un double emploi inutile, M. Bommer pouvant lui avoir donné un autre nom dans son mémoire en cours d'impression. L'*Adiantum Schaffneri* a les pinnules de l'*A. Capillus Veneris*, mais les frondes courtes, à peine ramifiées et souvent même simplement pinnées, naissant trés serrées sur un rhizome horizontal.

As is to be seen from the above, Fournier says that he does not want to describe a new species, since Bommer may be describing the plant also, but then he goes ahead and assigns a specific epithet *Schaffneri* and gives enough description to validate a species ordinarily. Christensen accepted *A. schaffneri* as validly published, but I am inclined to reject it as invalid, under Art. 34 of the Code (1961 edition), which states that a name is not validly published when it is not accepted by the author who published it. The matter is not of great importance, since the type seems to be only a depauperate form of the common *A. capillus-veneris* with the fronds simply pinnate or slightly bipinnate only at the very base.

6. Aspidium atomarium Muhl. ex Willd. *in* L. Sp. Pl. ed. 4, 5:279. 1810= **Cystopteris fragilis** (L.) Bernh. var. **mackayi** Lawson, Fern Flora of Canada 233. 1889.

In the Index Filicum and also in Broun's Index to North American Ferns this species is listed as a synonym of *Cystopteris bulbifera*

[6] Linnaea 17:569. 1843; type: Caracas, Jan.–Apr. 1842, *J. Linden*, which I have not seen.

(L.) Bernh., and it is retained there by Blasdell in his recent "A Monographic Study of the Fern Genus Cystopteris," although there is no indication that he ever saw the type or made any effort to do so. The holotype is in the Willdenow Herbarium (B), sheet no. 19822. It is a sterile plant, which is referable to *C. fragilis* rather than to *C. bulbifera*. From its locality, and general appearance, it belongs to the var. *mackayi*, which Blasdell considers a hybrid between *C. diaphana* and *C. fragilis*, which is unbelievable since one of the parents (*diaphana*) does not occur within thousands of miles of Pennsylvania.

7. ASPIDIUM ATTENUATUM Kunze ex Mettenius, Abh. Senckenb. Ges. Frankfurt 2:380. 1858[7] = **Thelypteris attenuata** (Kuntze) Morton, comb. nov. Based on *Dryopteris attenuata* Kuntze, Rev. Gen. Pl. 2:812. 1891.

Lastrea attenuata J. Smith *in* Hook. Journ. Bot. 3:412. 1841, nomen nudum.

Nephrodium attenuatum (Kunze) Baker *in* Hook. & Bak. Syn. Fil. 263. 1867, non Moore, 1858.

Dryopteris attenuata Kuntze, Rev. Gen. Pl. 2:812. 1891. New name for *Aspidium attenuatum* Kunze, non Swartz.

Dryopteris stenobasis C. Chr. Ind. Fil. 294. 1905. Based on *Aspidium attenuatum* Kunze, non Swartz. Since the name *D. attenuata* Kuntze was available and correct, *D. stenobasis* was superfluous when published and therefore illegitimate.

TYPE: Samar, Philippine Islands, *Cuming* 327 (isotype BM, Morton photograph 6451).

The basis for the validity of *Dryopteris attenuata* Kuntze is Art. 72 Note: "When a new epithet is required, an author may, if he wishes, adopt an epithet given to the taxon in an illegitimate name [here *Aspidium attenuatum* Kunze, non Swartz], if there is no obstacle to its employment in the new position or sense [here there was no available prior epithet and no previous use of the combination *Dryopteris attenuata*]; the epithet in the resultant combination is treated as new [thus here *D. attenuata* Kuntze, a new name, and not *D. attenuata* (Kunze) Kuntze]."

Copeland[8] adopts for this species the name *Cyclosorus alatellus* (Christ) Copel., based on *Nephrodium alatellum* Christ.[9] He may be right that these species are the same, but the valid use of the epithet *attenuata*, dating from 1891, has priority over *N. alatellum*, dating from 1901.

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[7] Non *Aspidium attenuatum* Swartz *in* Journ. Bot. Schrad. 1800[2]:34. 1801.

[8] Gen. Fil. 142. 1947.

[9] *In* Schum. & Lauterb. Fl. Deut. Südsee 112. 1901, based on a type from New Guinea.

8. ASPIDIUM CHONTALENSE Fourn. Bull. Soc. Bot. France 19:254. 1872=**Lastreopsis exculta** (Mett.) Tindale, Vict. Nat. 73:185. 1957 subsp. **guatemalensis** (Baker) Tindale, Contr. New So. Wales Nat. Herb. 3:245. 1963.
Nephrodium guatemalense Baker *in* Hook. & Bak. Syn. Fil. ed. 2, 498. 1874.
Syntypes: Guatemala, *Salvin & Godman*; Chiapas, *Ghiesbreght* 422.
Dryopteris exculta (Mett.) C. Chr. var. *guatemalensis* (Baker) C. Chr. Dansk. Vid. Selsk. Skrift. VIII, 6:96. 1920.
TYPE (of *A. chontalense*): Chontales, Nicaragua, *Levy* 516 (holotype P, Morton photograph 4657).

In his monograph of *Dryopteris*, Christensen regarded *Aspidium chontalense* Fourn. as a dubious species, thinking it perhaps the same as *D. hemsleyana* or *D. chiriquiana*. An examination of the holotype shows that it goes in a different section from these species, and is in fact identical with the rather common Central American plant usually known as *D. exculta* var. *guatemalensis*. This species, along with the closely related *D. effusa*, has been placed in a distinct genus *Parapolystichum*, which is not sufficiently distinct from *Lastreopsis*, according to the recent treatment by Tindale.[10]

9. ASPIDIUM DIPLAZIOIDES Moritz ex Mett. Abh. Senckenb. Ges. Frankfurt 2:367. 1858=**Thelypteris diplazioides** (Moritz) Ching, Bull. Fan. Mem. Inst. Biol., Bot. 10:251. 1941.
Dryopteris diplazioides (Moritz) Kuntze, Rev. Gen. Pl. 2:812. 1891.
Dryopteris moritziana Urban, Symb. Antill. 4:21. 1903 (Illegit.).
Type (of *Aspidium diplazioides* Moritz): *Moritz* 408, from Tovar, Venezuela; the original was probably lost in Leipzig, but I have seen isotypes at Hamburg, Leiden, and Paris (Morton photographs 1211, 4712, 5277, 5278, 5279).

The new combination was published by Ching without comment, along with a large number of other new combinations, with some errors as follows:

"*T. diplazioides* (Maritz) comb. nov.
Dryopteris dipalzioides (Maritz) Urban, C. Chr. Ind. 278"

Aside from the misspellings of Moritz and *diplazioides*, the authority stated is incorrect—it should be (Moritz) Kuntze. Urban's *Dryopteris diplazioides* (Desv.) Urban was based on *Gymnogramma diplazioides* Desv., an altogether different species (C. Chr. Ind. 262). However, this wrong citation of basionym will not invalidate the combination, which is clear from the parenthetical citation of Moritz and from the page reference to Christensen's Index Filicum.

10. ASPIDIUM GERMANII L'Herminier ex Fée, Mém. Foug. 11:82, *t. 22, f. 3.* 1866=**Thelypteris kunthii** (Desv.) Morton (see p. 53).

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[10] Monograph of the genus *Lastreopsis* Ching. Contr. New So. Wales Nat. Herb. 3:249–339, pl. I–XXIII. 1965.

TYPE: Rivière Noire, Ravine-Paradis, Guadeloupe, *L'Herminier* in 1861. There are two specimens collected in Guadeloupe by L'Herminier at Paris that agree with Fée's description; they are labeled *A. germani* but can hardly be holotypes since they lack the detailed locality data cited by Fée; however, in the absence of the Fée Herbarium, perhaps lost, the one with rhizome (Morton photograph 4677) can be designated lectotype; the other one, obviously a part of the same collection is an isolectotype (Morton photograph 4426).

It has always seemed rather odd that a species as widespread and relatively distinct as *Dryopteris normalis* C. Chr. never had a name before 1910. It appears now that there are two earlier names, at least, one of which forms the basis of *Thelypteris kunthii* (see below) and the other *Aspidium germanii* Fée (originally spelled "*germani*"). The latter was considered as a dubious species by Christensen in the Index Filicum, and as dubious also in his monograph of *Dryopteris*, where it is mentioned under *D. patens* (Swartz) Kuntze but still considered dubious. The specimens selected above as lectotypes are surely *normalis*. The peculiar thing is that there does not seem to be any other material of *normalis* from Guadeloupe. However, the species has been collected on Dominica, and there is every reason to expect it to occur in Guadeloupe and the other Windward Islands.

11. ASPIDIUM INTERMEDIUM Muhl. ex Willd. *in* L. Sp. Pl. ed. 4, 5:262. 1810
=**Dryopteris intermedia** (Muhl.) A. Gray, Manual ed. 1, 630. 1848.

I have studied the holotype (Pennsylvania, *Muhlenberg*, in Herb. Willd. no. 19788, photograph by Tryon, US). It consists of three portions of fronds. The frond at the left is *Dryopteris spinulosa* (O. F. Muell.) Watt in its usual sense for the eastern United States. The two fragments at the right are *D. intermedia* in the usual sense. The two latter are hereby designated as lectotypes, and the different frond at the left excluded, although it undoubtedly formed a part of the original concept of the species. The current nomenclature is thus preserved.

12. ASPIDIUM LEVYI Fournier, Bull. Soc. Bot. France 19:255. 1872=**Thelypteris levyi** (Fourn.) Morton, comb. nov.
Dryopteris levyi Kuntze, Rev. Gen. Pl. 2:813. 1891.
Type: Chontales, Nicaragua, *Levy* 463 (Holotypus P, Morton photograph 4690).

For comments regarding the relationships of this rare species of the section *Goniopteris* see Christensen, Monograph of the Genus Dryopteris 1:211. 1913.

13. ASPIDIUM OPPOSITUM Kaulf. ex Spreng. *in* L. Syst. Veg. ed. 16, 4:108. 1827
=**Ctenitis opposita** (Kaulf.) Copel. Gen. Fil. 124. 1947 [as "*oposita*"].
Dryopteris opposita (Kaulf.) Kuntze, Rev. Gen. Pl. 2:813. 1891.

Dryopteris mascarenarum Urban, Symb. Antill. 4:14. 1903. Based on *Aspidium oppositum* Kaulf., 1827, non *A. oppositum* Swartz, 1829. Illegitimate because superfluous when published. The species *A. oppositum* Kaulf. had priority over the Swartz name, and it was properly transferred to *Dryopteris* by Kuntze.[11]

Ctenitis mascarenarum Tardieu-Blot, Notul. Syst. 15:90. 1954. Illegitimate because the earliest available specific epithet was not adopted.

The locality given by Sprengel was "C.B.S.," i.e., Cape of Good Hope, but this was an error, for this species is not known from South Africa. Most of the new Kaulfuss' species published by Sprengel were based on the collections of Sieber, and this one was evidently based on *Sieber* 36 from Mauritius (Morton photograph 5274). The species is restricted to Mauritius, Réunion, and Madagascar.

In her latest work on the ferns of Madagascar, Madame Tardieu has continued to use the name *Ctenitis mascarenarum* (1958, p. 342), apparently overlooking entirely the publication of *C. opposita* (Kaulf.) Copel.

14. Aspidium sclerophyllum Poeppig ex Spreng. *in* L. Syst. Veg. ed. 16, 4:99. 1827 = **Thelypteris sclerophylla** (Poeppig ex Spreng.) Morton, Amer. Fern Journ. 41:87. 1951.

In making the new combination I gave the basionym as *Aspidium sclerophyllum* Kunze ex Spreng. Syst. Veg. 4:99. 1827, following the usage in the Index Filicum. I remarked in a footnote that Sprengel actually attributed the species to Poeppig, but that this was presumably an error. It is true that later, in 1834, Kunze attributed the species to himself, and he may very well have provided the name for Poeppig. Still, the name is attributed to Poeppig, and there is absolutely no mention of Kunze in the original description. I have now seen two isotypes (in Leiden and Hamburg, Morton photographs 1052 and 5238, respectively) bearing original labels reading "*Aspidium sclerophyllum* En. Pl. Cub. Ms." referring to Poeppig's own unpublished manuscript on his Cuban collections. Therefore, it seems necessary to regard Poeppig as the author. The description itself was presumably provided by Sprengel. Although primarily a zoologist, Poeppig did work on his own botanical collections and published some taxonomic botanical papers. The same arguments apply to the authorities of the names *Anemia cicutaria* Poeppig, *A. cuneata* Poeppig, *Polypodium barbatum* Poeppig, and *Adiantum fructuosum* Poeppig, all of which have generally been attributed erroneously to Kunze.

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[11] Of course the name *Dryopteris opposita* (Vahl) Urban, Symb. Antill. 4:14. 1903, is illegitimate, being a later homonym of *D. opposita* (Kaulf.) Kuntze, 1891.

15. ASPLENIUM ADIANTOIDES Lam. Encycl. Méth. 2:309. 1786.

In the Species Plantarum (1753), Linneaus proposed *Trichomanes adiantoides* as follows:

> Trichomanes frondibus pinnatis: pinnis ensiformibus acuminatis inciso-serratis: serraturis bifidis. *Fl. zeyl.* 385.
>
> Adianthum africanum rutae murariae aemulum, segmentis longioribus acutis. *Pluk.* alm. 10. *t.* 123, *f.* 6.
>
> Filix non ramosa zeylanica, foliis adianthi in modum serratis. *Burm. zeyl.* 97, *t.* 43.
>
> *Habitat in* India, Africa.

Thus, *Trichomanes adiantoides* L. was based on two elements, one from Ceylon, illustrated by Burmann from a Hermann specimen, and one from Africa, illustrated by Plukenet. These two elements are certainly not the same species, and are probably not even closely allied; the former, from Ceylon, has been known generally as *Asplenium falcatum* Lam. and the latter, from Africa, as *Asplenium praemorsum* Swartz or *A. furcatum* Thunb.

Nomenclaturally, there is an intricate problem brought on by the treatment of Lamarck, who was the first to realize that two species were involved. In 1786, Lamarck described the two species, the Ceylon plant as *Asplenium falcatum* Lam., citing the Burmann *t. 43*, and the African plant as *Asplenium adiantoides* Lam., treated as though it were a new species, although the name appears to have been adopted from Linnaeus, and Plukenet *t. 123, f. 6*, is cited as a synonym, and mention made of the fact that *Trichomanes adiantoides* L. was a mixture. If would seem that the type of *T. adiantoides* L. must be the Ceylon plant, for Linnaeus diagnosed his species in his own Flora Zeylanica in 1747 on the basis of Burmann's plate and very likely also on an actual specimen collected in Ceylon by Hermann. Lamarck was therefore unjustified in typifying the Linnaean species on the basis of the African plant illustrated by Plukenet. Instead of describing the Ceylon plant as a new species, *A. falcatum*, Lamarck should have called it *A. adiantoides* (L.) Lam., and the African plant should have been the new species (from Lamarck's information; actually, the African species had already been described unknown to Lamarck three times: as *Trichomanes aethiopicum* Burm. (1768), *Asplenium lanceolatum* Forsk. (1775), and *Acrostichum filare* Forsk. (1775)). Therefore, it appears that *A. falcatum* Lam. was an illegitimate name, since the type of *T. adiantoides* was cited in synonymy, and that *A. adiantoides* Lam. must be treated as a new species rather than a new combination, legitimate, but with legitimate prior taxonomic synonyms. The type of *A. falcatum* Lam. must be considered the same as that of *Trichomanes adiantoides* L., since it is a renaming of the Linnaean species and not a new species, and therefore it is the

t. 43 of Burmann and the Hermann specimen from Ceylon, if that is in existence.

Christensen came to this same conclusion in his Index Filicum, and attempted to remedy it by proposing for the Ceylon species (*A. falcatum*) the new combination *Asplenium adiantoides* (L.) C. Chr. (Ind. Fil. 99. 1905) (not *A. adiantoides* Lam., 1786, not Raddi, 1819, not Raoul, 1844), but of course this is illegitimate, being a later homonym thrice over, although it has still remained in use somewhat, e.g., by Tardieu in the new Flora of Madagascar. The next oldest name that is usable, and which refers to this species in a broad sense is *Asplenium polyodon* Forster (Prodr. 80. 1786).

The type of *A. adiantoides* Lam. was not indicated. Two specimens were cited, one from the Cape of Good Hope, *Sonnerat* and one from the Ile de France, *Commerson*. Finally there was also cited Peru, *Jussieu* (Herb. Jussieu Cat. 1252, P, Morton photograph 3030), but the comment "mais cette dernière est à pinnules un peu plus grandes," indicates that the Peruvian plant was not considered typical; the specimen represents a form of the American *A. praemorsum* Swartz. The Sonnerat plant is presumably the one now in the Lamarck Herbarium at Paris (Morton photograph 2752), which lacks locality data on the sheet; and it may be also the very young plant, just partially developed, which is annotated "Asplenium adiantoides, dict." (Morton photograph 2753). The Commerson specimen from Ile de France, now in the Jussieu Herbarium at Paris, is a fine, mature specimen (Morton photograph 3029); it must have been the one chiefly used in drawing up the original description; this latter specimen is here designated as lectotype. This species is widespread in both the Old and New World; it should be known at present as *Asplenium aethiopicum* (Burm.) Becherer. It is extremely variable and may be a collective species. The American plants, if they can be separated, would continue to be known as *A. praemorsum* Swartz.

The synonymy of these two species may be summarized as follows:

Asplenium aethiopicum (Burm.) Becherer, Candollea 6:23. 1935.
Trichomanes aethiopicum Burm. Fl. Cap. Prodr. 28 bis. 1768.
Asplenium lanceolatum Forsk. Fl. Aeg. Cent. VII. 185. 1775, non Huds. 1762.
Acrostichum filare Forsk. Fl. Aeg. Cent. VII. 184. 1775.
Asplenium adiantoides Lam. Encycl. Méth. 2:309. 1786.
Asplenium praemorsum Swartz, Prodr. Veg. Ind. Occ. 130. 1788.
Asplenium falsum Retz. Obs. 6:38. 1791.
Asplenium furcatum Thunb. Prodr. Fl. Cap. 172. 1800.
Asplenium filare Alston, Journ. Bot. 72:4. 1934.
Asplenium polyodon Forst. Fl. Ins. Austr. Prodr. 80. 1786.
Trichomanes adiantoides L. Sp. Pl. 2: 1098. 1753.

Asplenium falcatum Lam. Encycl. Méth. 2:306. 1786. Nom. abort.
Asplenium cultratum Gaud. Frey. Voy. Bot. 317. 1827.[12]
Asplenium intermedium Kaulf. ex Spreng. *in* L., Syst. Veg. ed. 16, 4:84. 1827, non Presl 1822.[12]
Asplenium kaulfussii Presl, Tent. Pterid. 106. 1836, non Schlecht. 1825.
Asplenium cumingii Mett. Fil. Hort. Lips. 74, *t. 12, f. 8.* 1856.[12]
Asplenium forsterianum Col. Tasm. Journ. 2:171. 1845.[12]
Tarachia haenkeana Presl, Epim. Bot. 76. 1849 (1851).[12]
Asplenium adiantoides (L.) C. Chr. Ind. Fil. 99. 1905, non Lam., 1786, non Raddi, 1819, non Raoul, 1844.

16. Asplenium affine Swartz var. **tanalense** Baker, Journ. Bot. Brit. & For. 18:329. 1880.
Asplenium gilpinae Baker, Journ. Linn. Soc. [London] 16:200. 1877.
Asplenium affine var. *gilpinae* Tardieu, Mém. Inst. Sci. Madagasc. 7:48. 1956.
TYPE: Tanala, Madagascar, *L. Kitching* (not seen, presumably at K).

Madame Tardieu has used the name var. *gilpinae* for this plant in her account of the ferns of Madagascar.[13] However, although the epithet *gilpinae* has priority (1877) as a species, the name var. *tanalense* (1880) has priority as a variety over *gilpinae* (1956), and consequently the name var. *tanalense* is correct, since names have priority only within their own rank.[14]

17. ASPLENIUM MACDONELLII Beddome, Journ. Bot. Brit. & For. 27:73. 1889= **Dryoathyrium macdonellii** (Beddome) Morton, comb. nov.
Cornopteris macdonellii Tardieu, Amer. Fern Journ. 48:32. 1958.
Parathyrium macdonellii Holttum, Kew Bull. 1958:449. 1959.
TYPE: Chumba Valley, Himalaya Mountains, India, 5,000 feet alt., *Macdonell* (not seen, presumably K).

For a comment on *Dryoathyrium* see under *Dryopteris forsythii-majoris* (p. 43).

18. ATHYRIUM PRAESTANS Copel. Amer. Fern Journ. 38:132. 1948=**Diplazium praestans** (Copel.) Maxon ex Morton, comb. nov.
TYPE: Chazuta, Peru, *Klug* 4002 (holotype US).

In describing this species as an *Athyrium*, Dr. Copeland was following his own views as outlined in his Genera Filicum (1947), in which the large genus *Diplazium* was reduced to a synonym of *Athyrium*. This illustrates very well the inconsistency of Copeland's views regarding genera. Sometimes, as in the Hymenophyllaceae and some groups of Polypodiaceae, he split the genera so finely that the characters are hardly more than specific, and again large and generally

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[12] Synonymous fide C. Chr. Ind. Fil. 1905.
[13] *In* Humbert, Fl. Madag. Fam. 5, 1:234. 1958.
[14] International Code of Botanical Nomenclature, 1961 ed., Art. 60.

recognized and generally distinguishable genera like *Diplazium* and *Athyrium* are lumped together with a minimum of justification and justice. Most species are readily and easily placed in *Diplazium* or *Athyrium*, and detailed study would allow the definite placement of the few species that seem at present dubious or intermediate. It seems likely that this could be done readily if fresh material becomes available, since it has been found by Manton and Sledge, Brownlie, Mehra and Bir, and others that *Athyrium* has a basic chromosome number of $x=40$ and *Diplazium* $x=41$.

Diplazium praestans, originally segregated under this name by Dr. Maxon but left unpublished, has been known only from the Departments of San Martín and Junín, Peru. It may now be reported from the Department of Loreto: San Alejandro River, Department of Loreto, Peru, July 24, 1958, *F. Woytkowski* 5118 (US). Mr. Woytkowski observed that there were 30 to 40 plants, all distinct, crowded in a small area of a wet shady forest at an elevation of about 400 meters.

19. Blechnum treubii van Alderw. van Rosenb. Bull. Dept. Agric. Indes Neerl. 18:13. 1908=**Blechnum lanceola** Swartz, Kungl. Svenska Vetens.-akad. Handl. 1817:71, *t. 3, f. 2.* 1817.

Type: Cultivated in the Botanical Garden, Bogor. A specimen in the Rijksherbarium labeled as "Cult. in Hort. Bog. II. K. X. 23" (Morton photograph 728) is probably authentic material, if not a part of the type.

This species was said by van Alderwerelt van Rosenburgh to have been brought to the botanical garden in Bogor from Mount Salak, Java, but this is hardly believable. No one else has ever found a similar plant growing wild in Java, but the specimen is identical with the well-known Brazilian species *Blechnum lanceola* Swartz, the most distinctive species in the subgenus *Blechnum*, the only species having a simple blade, this absolutely entire and unlobed. It must be presumed that the plant was mislabeled in Bogor, and that it really was introduced from Brazil.

20. Dryopteris arcana Maxon & Morton, Bull. Torr. Bot. Club 65:352, *t. 11.* 1938=**Thelypteris arcana** (Maxon & Morton) Morton, comb. nov.

Type: Tena to Napo, Ecuador, *Mexia* 7174 (US).

21. Dryopteris consobrina Maxon & Morton, Bull. Torr. Bot. Club 65:356. 1938=**Thelypteris consobrina** (Maxon & Morton) Tryon, Rhodora 69:5. 1967.

Type: La Merced, Peru, *Killip & Smith* 24087 (holotype US, isotype NY).

22. Dryopteris ensiformis C. Chr. Dansk. Vid. Selsk. Skrift. VII, Naturv. Afd. 10(2):269, *f. 46.* 1913=**Thelypteris ensiformis** (C. Chr.) Tryon, Rhodora 69:6. 1967.

Type: La Palma, Costa Rica, *Tonduz* (Herb. Inst. Nat. Cost. 12533) (holotype C, isotype US).

23. DRYOPTERIS FORSYTHII-MAJORIS C. Chr. Dansk Bot. Ark. 7:63. 1932=
Dryoathyrium forsythii-majoris (C. Chr.) Morton, comb. nov.
Parathyrium forsythii-majoris Holttum, Kew Bull. 1958:449. 1959.
TYPE: Madagascar, *Forsyth Major* 169 (isotype C, Morton photograph 5685).

In 1956, Mme. Tardieu-Blot published a paper [15] on the genus *Cornopteris* Nakai, and referred a number of species to the genus that had formerly been called *Dryopteris* or other genera. The species *Dryopteris forsythii-majoris* was formally transferred to *Cornopteris* in the American Fern Journal (48:32. 1958). However, not long thereafter R. E. Holttum published [16] a paper "*Parathyrium*, a new genus of ferns, with comments on *Cornopteris* Nakai," in which he showed that the type of *Cornopteris*, *C. decurrenti-alata* (Hook.) Nakai, is closely allied to *Athyrium*, and is essentially an exindusiate *Athyrium*, whereas *C. boryana* (Willd.) Tardieu (based on *Aspidium boryanum* Willd.) and its allies constitute a different genus, allied to *Ctenitis*, for which he proposed the name *Parathyrium*. Unfortunately, he overlooked the fact that the same species *Aspidium boryanum* Willd. had already been made the type of a new genus *Dryoathyrium* Ching in 1941 as he pointed out in a subsequent paper.[17] Ching and Tagawa have transferred several species to *Dryoathyrium*, but there are several more that belong there.

24. DRYOPTERIS LINGULATA C. Chr. Dansk. Vid. Selsk. Skrift. VII. Naturv. Afd. 10(2):271. 1913=**Thelypteris lingulata** (C. Chr.) Morton, comb. nov.
TYPE: Río Hondo, Costa Rica, *Pittier* 10349 (isotype US).

25. DRYOPTERIS MINUSCULA Maxon, Kew Bull. Misc. Inf. 1932:135. 1932=
Thelypteris minuscula (Maxon) Morton, comb. nov.
TYPE: Río Dagua, near Buenaventura, Colombia, *Lehmann* 4433 (holotype K).

26. DRYOPTERIS NESIOTICA Maxon & Morton, Bull. Torr. Bot. Club 65:362, *t. 12*. 1938=**Thelypteris nesiotica** (Maxon & Morton) Morton, comb. nov.
TYPE: Trinidad, *Jenman* (holotype NY).

27. DRYOPTERIS PARVISORA C. Chr. Ark. för Bot. 14(19):5. 1916=**Dryoathyrium parvisorum** (C. Chr.) Morton, comb. nov.

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[15] "Sur le genre Cornopteris Nakai et les Cornopteris Malgaches," Mém. Inst. Sci. Madagascar, Sér. B, 7:27–32. 1956. The species *C. forsythii-majoris* is illustrated in figure I, nos. 6–8.

[16] In "Notes on Malaysian Ferns, with descriptions of a new genus and a new species," Kew Bull. 1958:447–455. 1959.

[17] "Vegetative characters distinguishing the various groups of ferns included in Dryopteris of Christensen's Index Filicum, and other ferns of similar habit and sori," Gardens' Bull., Singapore, 17:361–367. 1960.

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Cornopteris parvisora Tardieu, Amer. Fern Journ. 48:32. 1958.
Parathyrium parvisorum Holttum, Kew Bull. 1958:449. 1959.
TYPE: Moramanga, Madagascar, Oct. 1, 1912, *Afzelius & Palm* 371 (holotype not seen, presumably S).

28. DRYOPTERIS STANDLEYI Maxon & Morton, Bull. Torr. Bot. Club 65:368 1938=**Thelypteris standleyi** (Maxon & Morton) Tryon, Rhodora 69:8. 1967.
TYPE: Quiriguá, Guatemala, *Standley* 23126 (holotype US).

29. DRYOPTERIS TURRIALBAE Rosenst. Repert. Sp. Nov. Fedde 22:10. 1925=**Thelypteris turrialbae** (Rosenst.) Morton, comb. nov.
TYPE: Turrialba, Costa Rica, *Brade* 357 (isotype NY).

30. ELAPHOGLOSSUM ALATUM Gaudichaud, *in* Vaillant, Voyage Autour Monde Bonite Bot. Atlas *t. 135*. 1845–50=**Elaphoglossum gorgoneum** (Kaulf.) Brack.
Acrostichum gorgoneum Kaulf. Enum. Fil. 63. 1824. Type: Oahu, Hawaiian Islands, *Chamisso* (presumably LE).
Acrostichum sessile Fée, Gen. Fil. 43. 1852. Based on *Elaphoglossum alatum* Gaud. A renaming, because of the unavailability of the epithet *alatum* under *Acrostichum*. Not *Acrostichum alatum* Roxb. (1844) or *A. alatum* Fée (1845).
Elaphoglossum gorgoneum (Kaulf.) Brack. U.S. Expl. Exped. 16:74. 1854.
Elaphoglossum sessile (Fée) Moore, Ind. Fil. 14. 1857. Illegitimate, since the name *E. alatum* Gaud. was legitimate and available under the genus *Elaphoglossum*.

The species *Elaphoglossum sessile* (Fée) Moore is listed as dubious in Christensen's Index Filicum, and apparently has remained unplaced. As shown by the synonymy above, this name is illegitimate, since Moore did not adopt the earliest specific epithet available, namely *Elaphoglossum alatum* Gaud. Although there is no description, the plate provided by Gaudichaud, which is a fine one, with analyses, is a valid publication by Article 44 of the International Code of Botanical Nomenclature (ed. 1961). The holotype in the Muséum National d'Histoire Naturelle, Paris, has been studied (Morton photograph 4035); it is obviously referable to the distinctive endemic species of the Hawaiian Islands *E. gorgoneum*, which has priority. For additional taxonomic synonyms, see Robinson, Bull. Torr. Bot. Club 39:572. 1912. The date of publication of *t. 135* of Gaudichaud is uncertain, but between 1845 and 1850.[18]

31. **Elaphoglossum pellucidum** Gaudichaud, *in* Vaillant, Voyage Autour Monde Bot. Atlas *t. 79, f. 5*. 1844.
Acrostichum micradenium Fée, Mém. Foug. 2:43. 1845.
Elaphoglossum nitidum Brack. U.S. Expl. Exped. 16:70. 1854. Type: Hawaiian Islands, Wilkes Expedition (holotype US).
Elaphoglossum micradenium (Fée) Moore, Ind. Fil. 12. 1857.

[18] See Johnston, Journ. Arn. Arb. 25:481–487. 1944.

Elaphoglossum pellucidum Gaud. was rejected in Christensen's Index Filicum in favor of *E. micradenium* (Fée) Moore, apparently because it was without a description. However, the plate with analyses provided by Gaudichaud validates the name according to the Code of Nomenclature. There is a further question regarding the date of publication, given as 1846 by Christensen. However, *t. 79* was published in 1844, according to Johnston.[19] A sheet in the herbarium in Paris collected by Gaudichaud (no. 13), from the "Iles Sandwich," September and October, 1836, on the Voyage of the Bonite, was obviously used for the illustration in the publication; this holotype is Morton photograph 4028. Although it is the holotype of *E. pellucidum* it does not bear this name. Fée's *Acrostichum micradenium* was also based on a Gaudichaud collection from the Hawaiian Islands, and the holotype is probably the same sheet as the holotype of *E. pellucidum*, or at least this sheet is an isotype.

32. GONIOPTERIS MOLLIS Fée, Gen. Fil. 252. 1852=**Thelypteris ghiesbreghtii** (Hook.) Morton, comb. nov.

Polypodium ghiesbreghtii Linden, Cat. 18. 1858 ? (not seen; nom nud.?) From the name, the type would appear to have been cultivated material, received originally from Ghiesbreght, probably from Chiapas, Mexico.

Polypodium crenatum var. *ghiesbreghtii* Hook. Sp. Fil. 5:3. 1864. Type: Tabasco, Mexico, *Linden* 1499 (as "*Gheisbeghtii*").

Polypodium ghiesbreghtii Linden ex Baker, *in* Hook. & Bak. Syn. Fil. 315. 1868.

Dryopteris ghiesbreghtii C. Chr. Ind. Fil. 267. 1905.

Dryopteris mollis (Fée) Maxon, Contr. U.S. Nat. Herb. 13:18. 1909, non *D. mollis* (Jacq.) Hieron. (1907).

TYPE: Tabasco, Mexico, *Linden* 1499 (isotype P, Morton photograph 4679.

Although *Goniopteris mollis* Fée is the earliest specific name, the epithet *mollis* may not now be transferred to *Thelypteris* because of *T. mollis* (Mett.) Tryon. This is a common species of the section *Goniopteris*, allied to *Thelypteris poiteana* (Bory) Proctor. Maxon knew it from Tabasco, Guatemala, and Costa Rica in 1909, but it has since been found to be quite common, and is known also from Chiapas, British Honduras, Honduras, Nicaragua, and Panama.

33. GYMNOGRAMMA POLYPODIOIDES Link, Hort. Berol. 2:50. 1833=**Thelypteris linkiana** (Presl) Tryon, Rhodora 69:6. 1967.

Gymnogramma diplazioides Desv. Mém. Soc. Linn. Paris 6:214. 1827. Type: Hispaniola, without collector (presumably P).

Grammitis linkiana Presl, Tent. Pterid. 209. 1838. Based on *Gymnogramma polypodioides* Link, Hort. Berol. 2:50. 1833, non Sprengel, 1827.

Dryopteris diplazioides Urban, Symb. Antill. 4:21. 1903, non Kuntze, 1891.

Dryopteris linkiana Maxon, Journ. Washington Acad. Sci. 14:199. 1924.

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[19] See Journ. Arn. Arb. 25:481–487. 1944. I am indebted to Mr. William T. Stearn for pointing out this Johnston reference to me.

Thelypteris diplazioides (Desv.) Proctor, Bull. Inst. Jamaica Sci. Ser. 5:59. 1953, non *T. diplazioides* (Moritz ex Mett.) Ching, Bull. Fan. Mem. Inst. Biol., Bot. 10:251. 1941.

TYPE: A cultivated specimen (presumably B).

This species has had a regrettable nomenclatural history, because of the existence of another specific epithet *diplazioides* for an entirely different species which Kuntze transferred to *Dryopteris* in 1891 as *D. diplazioides* (Moritz) Kuntze. Nevertheless, in spite of the existence of this earlier *Dryopteris diplazioides*, Urban in 1903 proposed the new combination *D. diplazioides* (Desv.) Urban, which of course was a later homonym and therefore illegitimate, but was nevertheless erroneously adopted in the Index Filicum. At the same time the perfectly valid *Dryopteris diplazioides* (Moritz) Kuntze was renamed *D. moritziana* Urban, another illegitimate name, superfluous when published, which was also recognized by Christensen. This nomenclaturally impossible treatment has inevitably created some confusion, which was continued by the publication by Mr. Proctor of yet another illegitimate combination *Thelypteris diplazioides* (Desv.) Proctor. The earliest available specific name remains *linkiana*.

34. HEMICARDION CUMINGIANUM Fée, Gen. Fil. 283. 1852 = **Cyclopeltis cumingiana** (Fée) Morton, comb. nov.

Lastrea presliana J. Smith *in* Hook. Journ. Bot. 3:412. 1841, nom. nud.

Cyclopeltis presliana Berkeley, Introd. Crypt. Bot. 517. 1857.

Polystichum preslianum Moore, Ind. Fil. 84. 1857.

TYPE: Luzon, Philippine Islands, *Cuming* 68 (isotype BM, Morton photograph 6623).

Lastrea presliana J. Smith was based on "*Nephrodium semicordatum*, Presl (exclus. syn. Sw. Willd.)," evidently referring to Presl's treatment in Reliquiae Haenkeanae 32. 1825. Presl's *Nephrodium semicordatum* is a new combination based on *Polypodium semicordatum* Swartz (1788) and must have the same type, namely a plant from the West Indies. Presl did refer to the species a specimen from Luzon, but he gave no description of it apart from a general description including the American type. Therefore, there is no description in Presl to base a new species on. Smith himself gave no description, except the comment that the sori are in the middle of the venules in his *L. presliana* and are terminal in the West Indian species. In connection with his original description of the genus *Cyclopeltis*[20] Smith remarked that these characters were inadvertently reversed and that he meant to say that the sori of the West Indian species are lateral and of his *L. presliana* terminal. This cannot be taken as an adequate description of a new species, especially as the character is untrue. The sori are dorsal on the venules of both species.

[20] Bot. Mag. Curtis 72, Compend. 36. 1846.

Although the species remained a nomen nudum, the name *Cyclopeltis presliana* (J. Smith) Berkeley has remained in general use, and if there were no competing name it could be accepted and dated from a later time. However, *Hemicardion cumingianum* Fée (1852) was validly described and has priority over any description of the species under the epithet *presliana*. This was recognized inferentially by Holttum[21] in a comment under *Cyclopeltis crenata* (Fée) C. Chr. to the effect that it [*C. crenata*] "differs from both these species in its strongly toothed scales, and from *C. presliana* (which should more properly be called *C. cumingiana* Fée) in the lower pinnae not being gradually and evenly reduced to a small size." However, this is an error, for there is no "*C. cumingiana* Fée," i.e., "*Cyclopeltis cumingiana* Fée" but only *Hemicardion cumingianum* Fée. This is an inadvertent new combination, but it cannot be considered validly published, since there is no citation of the basionym, which is required for valid publication of a new combination after January 1, 1953. Therefore, the above new combination is required.

35. HYMENOPHYLLUM DELICATISSIMUM Fée, Crypt. Vasc. Brés. 2:86, *t. 105, f. 1.* 1872–73 = **H. elegans** Spreng. *in* L. Syst. Veg. ed. 16, 4:133. 1827.
TYPE: Serra dos Orgãos, Brazil, *Glaziou* 3591 (holotype P, Morton photograph 4595).

In my revision, through typographical errors, the page of publication was erroneously given as 83 instead of 86, and the type number as 3491 instead of 3591.

36. HYMENOPHYLLUM ELEGANTISSIMUM Fée, Mém. Foug. 11:118, *t. 29, f. 2.* 1866 = **H. lineare** (Swartz) Swartz, Journ. Bot. Schrad. 1800 (2):100. 1801.
TYPE: Guadeloupe, *L'Herminier* (probable holotype P, 2 sheets, Morton photographs 4572, 4573).

In my revision of the American species of the section *Sphaerocionium*[22] I placed this species as a synonym of *H. hirsutum* (L.) Swartz (*H. ciliatum* Swartz) going by the original description and figure only. However, the two sheets at Paris that are labeled *H. elegantissimum* and which agree well enough with the description and illustration of Fée are clearly *H. lineare* (Swartz) Swartz, or at least the Guadeloupe form of this species, which is unusually large and delicate. The only sheet at Stockholm that could be the type of *Trichomanes lineare* Swartz does not bear the name in Swartz' hand, but it presumably is the holotype, from Jamaica, collected by Swartz (Morton photograph 6191). A duplicate agreeing with this specimen is in the Willdenow

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[21] Ferns of Malaya 527. 1954.
[22] Contr. U.S. Nat. Herb. 29:139–201. 1947.

Herbarium (no. 20221) at Berlin, a fragment sent to Willdenow by Swartz (photograph by Tryon, US).

37. Hymenophyllum fragile var. **venustum** (Desv.) Morton, Contr. U.S. Nat. Herb. 29:173. 1947.

In making this new combination for a rather common south Brazilian variant of the widespread *H. fragile* (Hedwig) Morton, I indicated that the basionym *Hymenophyllum venustum* Desv. (Mém. Soc. Linn. Paris 6:332. 1827) was a new name for *H. hirsutum* sensu Raddi, not Swartz, and thus that the type was from Mandiocca, Brazil, *Raddi*. It is true that Desvaux in describing his new species *H. venustum* cited "*Hymenophyll. hirsutum* Raddi, Syn. fil. bras., p. 19. Excl. syn." but it is extremely unlikely that he saw any specimen collected by Raddi. On the other hand, a specimen in the Desvaux Herbarium at Paris labeled *H. venustum* in Desvaux's hand is undoubtedly the actual specimen used in drawing up the description. This is the holotype (Morton photograph 4587).

38. Hymenophyllum producens Fée, Crypt. Vasc. Brés. 1:196, *t. 71, f. 4.* 1869.
TYPE: Serra dos Orgãos, Brazil, *Glaziou* 3349 (holotype P, Morton photograph 4625).

In my revision [23] I placed this species as a doubtful synonym of *H. valvatum* Hook. & Grev., following Christensen, but with a good deal of doubt, correctly as it now appears. The type shows that this species does not belong in the section *Sphaerocionium* but is a species of the section *Mecodium*, and is one of the allies of *H. polyanthos* (Swartz) Swartz. Its proper disposition must await a study of the Brazilian species of this difficult group.

39. Hymenophyllum silveirae Christ, *in* Schwacke, Pl. Nov. Mineiras 2:14. 1900.
SYNTYPE: Itacolumi, Brazil, *Schwacke* 12528 (P, Morton photograph 4619).

In my revision of *Hymenophyllum* section *Sphaerocionium* I recognized this species as distinct, going on Christ's description of the fronds as caespitose, although I expressed some doubt as to the correctness of this character, which is hardly to be expected in the genus *Hymenophyllum*. This syntype shows that the fronds are definitely not caespitose but are scattered on a filiform rhizome as in related species. The fronds are very small and probably depauperate. I judge that they represent depauperate plants of *H. pulchellum* Schlecht. & Cham. The only character that might be distinctive is that the plants of *H. silveirae* are said to be terrestrial, whereas those of *H. pulchellum*

[23] Contr. U.S. Nat. Herb. 29:161. 1947.

are epiphytic, so far as known. But if this character is important or uniformly true remains to be determined.

40. LONCHITIS JAVANICA Desr. *in* Lam. Encycl. Méth. 3:594. 1789=**Blotiella javanica** (Desr.) Morton, comb. nov.
Lonchitis pubescens Willd. ex Kaulf. Enum. Fil. 195. 1824.

The type of *L. javanica*, as the name indicates, was supposed to have been collected in Java by Commerson. In the Index Filicum, Christensen placed it as doubtfully being the same as the later *L. pubescens*, a species of Madagascar, Réunion, Mauritius, and the Seychelles Islands, the doubt occasioned by the locality. No species of *Lonchitis* has been known from Java and is not to be expected there. There is no specimen in Paris of *L. javanica* from Java, but there is a specimen in the Jussieu Herbarium, Cat. no. 1286 A, labeled *L. javanica*, in an old hand. The smaller specimen mounted on the sheet agrees in its dimensions and characters with the original description by Desrousseaux and is doubtless the holotype. It is, as might be expected, not from Java but from "Ile de Bourbon," i.e., Réunion, collected by Commerson. It is a small specimen of the species later described as *L. pubescens* Willd., as suspected by Christensen.

The type of *Lonchitis* L. has often been considered to be *L. aurita* L., as for instance by Christensen, but Tryon [24] has shown that this is not a suitable species, because the application of the name is uncertain. Linnaeus did not have a specimen of *L. aurita* but based the species on Plumier Tract. Fil. *t. 17*, an illustration that does not correspond with any plant known from Martinique, where Plumier obtained his material. The illustration shows a plant with the venation and general appearance of *Pteris* subgenus *Litobrochia*, but no species from Martinique has such broad and blunt segments. Still, it may be conjectured that Plumier did have a species of *Pteris* in hand, for *Lonchitis* as generally delimited does not grow in Martinique. I cannot believe that Tryon is right in thinking that *t. 17* represents *L. hirsuta* L. in part. This plant was also known to Plumier, who illustrated it very well, for him, in *t. 20*. The illustration and description of the veins as reticulate removes *L. hirsuta* from consideration, as well as the illustration and description of the stipe as bearing "soft, black spines," which are presumably scales with indurated bases. Such scales have been attributed to some *Pteris* species of the Lesser Antilles, such as *P. aculeata* Swartz, but *L. hirsuta* does not have any scales, only hairs. Tryon thinks that the description of *L. aurita* was based on a mixture of *L. hirsuta* and some unidentified species of *Pteris*, but I do not see any decisive evidence of this. For

[24] Contr. Gray Herb. 191:93–100. 1962.

this reason I think that *Lonchitis aurita* L. must be listed among the dubious species of *Pteris*. The genus usually called *Lonchitis* must therefore be called *Blotiella* Tryon (type: *Lonchitis glabra* Bory), and the small genus *Anisosorus* Trev. becomes a synonym of *Lonchitis* L. (type *L. hirsuta* L.).

41. MENISCIUM AFFINE Presl ex Ettingsh. Denkschr. Akad. Wiss. Math. Naturw. (Wien) 23:94, *t. 13, f. 3.* 1864; Farnkr. Jetztw. 170, *fig. 73, t. 135, f. 16.* 1865 = **Thelypteris affinis** (Presl) Morton, comb. nov.
Dryopteris dispar Maxon & Morton, Bull. Torr. Bot. Club 65:364. 1938. Based on *Meniscium affine* Presl, non *Dryopteris affinis* Newm. (1854).
TYPE: Brazil, collector unknown (not seen).

I have recently [25] considered *Meniscium* a section of *Thelypteris*, which necessitates a number of new combinations, which are proposed in this paper. Several of the most common species have already been transferred to *Thelypteris*, i.e., *T. serrata* (Cav.) Alston (1932), *T. angustifolia* (Willd.) Proctor (1953), *T. reticulata* (L.) Proctor (1953), and *T. salzmannii* (Fée) Morton (1960). Under *Dryopteris* several of the old specific epithets were preoccupied and not available, but these may now be used under *Thelypteris*.

42. MENISCIUM ANDREANUM Sodiro, Recens. 71. 1883; Crypt. Vasc. Quit. 392. 1893 = **Thelypteris andreana** (Sodiro) Morton, comb. nov.
Dryopteris andreana C. Chr. Ind. Fil. 252. 1905.
TYPE: Río Toachí, near Santo Domingo, Ecuador, *Sodiro* (not seen).

43. MENISCIUM ARBORESCENS Humb. & Bonpl. ex Willd. Sp. Pl. 5:133. 1810 = **Thelypteris arborescens** (Humb. & Bonpl.) Morton, comb. nov.
Phegopteris arborescens Mett. Fil. Lechl. 2:24. 1859.
Phegopteris mollis Mett. Ann. Sci. Nat. V, Bot. 2:242. 1864. Type: Llano de San Martin, Paraiso, Colombia, alt. 300 m., *Triana* (isotype US).
Nephrodium sorbifolium var. *molle* Hieron. Bot. Jahrb. Engler 34:449. 1904.
Nephrodium sorbifolium f. *angustipinnatum* Hieron. Bot. Jahrb. Engler 34:449. 1904. Type: Alto de las Cruces, near Cali, Colombia, alt. 1100 m., *Lehmann* 2927 (isotype US).
Dryopteris sorbifolia var. *mollis* Hieron. Hedwigia 46:351. 1907.
Dryopteris reticulata var. *arborescens* Brause, Verh. Bot. Ver. Brandenb. 51:2. 1910.
Dryopteris permollis Maxon & Morton, Bull. Torr. Bot. Club. 65:372. 1938. Based on *Phegopteris mollis* Mett., non *Dryopteris mollis* (Jacq.) Hieron. (1907).
Thelypteris mollis Tryon, Rhodora 69:7. 1967.

When Dr. Maxon and I prepared our revision of *Dryopteris* subgenus *Meniscium* in 1938 we had not seen the type of *Meniscium arborescens* Humb. & Bonpl. We placed it with a query as a synonym of *D. hostmannii* (Klotzsch) Maxon & Morton and were not greatly concerned

[25] Amer. Fern Journ. 53:154. 1963 [1964].

regarding its identity, since the specific epithet could not be taken up under *Dryopteris*, because there already existed a different *D. arborescens* (Baker) Kuntze, an entirely unrelated species from Samoa. However, under the generic name *Thelypteris* the epithet *arborescens* is not preoccupied. I have recently seen a photograph by Dr. Tryon of the holotype of *M. arborescens* from the Willdenow Herbarium in Berlin (sheet no. 19576); the type came from the region of the Mission of Santa Cruz, Venezuela.[26] The photograph matches closely a collection from Vegas del Río de El Cantaño, State of Aragua, Venezuela, April 25, 1937, made by H. Pittier (no. 14003), which is the species that Maxon and I called *Dryopteris permollis*, rather than *D. hostmannii*. One of the chief features rendering *Meniscium arborescens* a questionable species was the description by Humboldt and Bonpland of the plants being arborescent and having a trunk 6-feet high, which is unlike any known *Meniscium*. This must have been an error, very likely a confused memory. The type specimen is a detached frond, without a rhizome, but doubtless the rhizome is subterranean and short-creeping like other specimens of *D. permollis* and other Menisciums.

44. MENISCIUM CHRYSODIOIDES Fée, Gen. Fil. 225. 1852=**Thelypteris chrysodioides** (Fée) Morton, comb. nov.
Dryopteris chrysodioides Maxon & Morton, Bull. Torr. Bot. Club 65:373. 1938.
TYPE: "Habitat in America australi., Collect. Pamplin., in Herb. cl. Moug., no. 55" (not seen; possibly at Oxford University).

The following variety may also be transferred: *Dryopteris chrysodioides* var. *goyazensis* Maxon & Morton, Bull. Torr. Bot. Club 65:374. 1938=**Thelypteris chrysodioides** var. **goyazensis** (Maxon & Morton) Morton, comb. nov. Type: Rio Corumba, Goyaz, Brazil, *Glaziou* 22631 (holotype NY).

45. MENISCIUM FALCATUM Liebm. Dansk. Vid. Selsk. Skrift. V, 1:183. 1849=**Thelypteris falcata** (Liebm.) Tryon, Rhodora 69:6. 1967.
Meniscium jurgensenii Fée, Gen. Fil. 223. 1852 (as "Jungersenii"). Type: Mexico, *Jurgensen* 917 (not seen).
Dryopteris falcata C. Chr. Dansk. Vid. Selsk. Skrift. VII. Naturv. Afd. 10(2):270. 1913, non Kuntze (1891).
Dryopteris jurgensenii Maxon & Morton, Bull. Torr. Bot. Club 65:360. 1938.
TYPE: Lacoba, Chinantla, Puebla, Mexico, *Liebmann* 2756 (holotype C!, isotypes K, US).

46. MENISCIUM GIGANTEUM Mett. Fil. Lechl. 1:19. 1856=**Thelypteris gigantea** (Mett.) Morton, comb. nov.

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[26] See Sandwith on the Venezuelan localities of Humboldt & Bonpland, Kew Bull. Misc. Inf. 1925:301. 1925.

Dryopteris gigantea C. Chr. Ind. Fil. 267. 1905, non Kuntze (1891).
Dryopteris simplicifrons C. Chr. Ind. Fil. 486. 1906. Based on *Meniscium giganteum* Mett.

TYPE: San Gavan, Peru, *Lechler* 2292 (isotype K).

47. MENISCIUM LONGIFOLIUM Desv. Mém. Soc. Linn. Paris 6:223. 1827 = **Thelypteris longifolia** (Desv.) Tryon, Rhodora 69:7. 1967.
Dryopteris desvauxii Maxon & Morton, Bull. Torr. Bot. Club 65:369. 1938. Based on *Meniscium longifolium* Desv., non *Dryopteris longifolia* (Fée) Hieron.

TYPE: Brazil, without further locality or collector (P, photograph of holotype US).

It is not necessary to repeat here the intricate nomenclatural situation of this species when it is referred to the genus *Dryopteris*. When it is placed in *Thelypteris*, there is no problem, for the earliest specific epithet *longifolia* can be adopted without question.

The following form may also be transferred: *Dryopteris desvauxii* f. *glandulosa* Maxon & Morton, Bull. Torr. Bot. Club 65:372. 1938. Type: Morro das Pedras, São Paulo, Brazil, *Brade* 5753 (holotype NY) = **Thelypteris longifolia** (Desv.) Tryon f. **glandulosa** (Maxon & Morton) Morton, comb. nov.

48. MERTENSIA SQUAMULOSA Desv., Journ. de Bot. Appliqué 1:268. 1813 = **Gleichenia squamulosa** (Desv.) Moore, Ind. Fil. 383. 1862.

This species has generally been considered dubious, even by Poiret, who probably had material available for study. The original description, although not so very brief, does not mention the really distinctive characters, and the locality is stated only generally as South America. It is as follows: "Stipite ramisque angulato squamoso; frondibus pinnatis pinnis lanceolato-acutis, pinnulis linearibus oblongis, extimis confluentibus. Habitat in America australi."

The holotype, in the Muséum National d'Histoire Naturelle, Paris, in the Desvaux Herbarium is a good specimen. It was studied by Weatherby, who reported [27] that it was apparently the same as *G. pedalis* (Kaulf.) Sprengel,[28] a well-known Chilean species. Weatherby quoted the locality as "America australi (Termae Chili)," but this was a misreading of the label, which really reads "America australi (in Peruvia Chilen.)." Although the Desvaux epithet has priority, Weatherby hesitated to displace the name *G. pedalis* without further study. I can now verify Weatherby's determination, and so there seems now no reason not to adopt the prior name *G. squamulosa* (Desvaux) Moore. The holotype has been photographed (Morton 4534).

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[27] Contr. Gray Herb. 114:27. 1936.

[28] In L. Syst. Veg. ed. 16, 4:26. 1827, based on *Mertensia pedalis* Kaulf. Enum. Fil. 39. 1824.

The confusion as to the locality undoubtedly goes back to the original collector. There is another sheet in Paris (Morton photograph 4535) which is identical with the holotype, and which bears the label Chile, *Dombey*. Another collection at Paris (Herb. Bory, Morton photograph 4492) is also the same, and this one gives the locality as Peru (no collector stated). This is not the only instance in which Dombey's localities are confused between Peru and Chile. This collection marked as from "Peru" is identical with Chilean specimens of *G. pedalis* and unlike any Peruvian species.

49. NEOTTOPTERIS STIPITATA J. Smith, Cat. Cult. Ferns 49. 1857 = **Asplenium stipitatum** (J. Smith) J. Smith, Ferns Brit. & For. 210. 1866.
Asplenium squamulatum Blume var. *smithii* Hook. Sp. Fil. 3:83. 1860. Based on *Neottopteris stipitata* J. Smith (1857).
Asplenium robinsonii F. von Muell. Journ. Bot. Brit. & For. 22:289. 1884. Type: Norfolk Island, *Robinson* in 1884 (holotype BM, Morton photograph 7202, isotype K, Morton photograph 8010).
TYPE: Cultivated in the Royal Botanic Gardens, Kew (holotype from the J. Smith Herbarium, BM, Morton photograph 7203).

The original *Neottopteris stipitata* J. Smith *in* Hook. Journ. Bot. 3:409. 1841, was a nomen nudum, based on *Cuming* 195 from Camarines Sur [Luzon, Philippine Islands]. A plant at the Royal Botanic Gardens, Kew, was cultivated under this name for a long time, and was supposed to have been grown from spores from the Cuming collection. However, the Cuming collection is *Asplenium squamulatum* Blume whereas the cultivated plant is different. Although much less extreme in its irregularity it appears to agree with the type of *Asplenium robinsonii* F. von Muell., and it was therefore very likely introduced into Kew from Norfolk Island, and not from the Philippine Islands.

50. NEPHRODIUM KUNTHII Desvaux, Mém. Soc. Linn. Paris 6:258. 1827 = **Thelypteris kunthii** (Desv.) Morton, comb. nov.
Dryopteris normalis C. Chr. Ark. för Bot. 9[11]:31. 1910.
Thelypteris normalis Moxley, Bull. So. Calif. Acad. Sci. 19:57. 1920.
TYPE: Cumanacoa, Venezuela, *Humboldt & Bonpland* (lectotype P).

The complete original description of Desvaux was:
"59. N[ephrodium]. kunthii N. Aspid[ium]. patens Kunth, in Humb. et Bonpl., Nov. gen. 1, p. 13. Excl. syn."
This is not a good way to publish a new species, but it is a possible and valid way, by reference to a description under another name previously, effectively, and validly published. There is a description in H.B.K., Nov. Gen. et Sp. 1:13. 1815, and this work is certainly effectively and validly published. Therefore the description of *Nephrodium kunthii* is the one given in H.B.K. and the type is the

specimen or specimens on which that was based, namely Humboldt and Bonpland specimens collected "prope Cumanacoa, Guanaguana et Caripe" [Venezuela]. The synonyms to be excluded were *Aspidium patens* Swartz and *Polypodium patens* Swartz. Desvaux properly transferred the latter to *Nephrodium* as *N. patens* (Swartz) Desv. (Mém. Soc. Linn. Paris 6:258. 1827).

A specimen in the Desvaux Herbarium at Paris (Morton photograph 4424) has the name *N. kunthii* Desv. and the synonym *Aspidium patens* Kunth in the hand of Desvaux. The locality is given as "Habitat ad Caracas." It is a single pinna, which was very likely removed by Desvaux from a Humboldt and Bonpland collection. The locality "Caracas" to older authors often signified the whole of modern Venezuela. However, this fragment cannot be considered the type of the species, for the description of Kunth was not based on it. In the Humboldt Herbarium at Paris there is a specimen collected by Humboldt and Bonpland labeled *Aspidium patens* and which was collected at Cumanacoa, Caripe. This is undoubtedly the plant or one of the plants on which the description of *Aspidium patens* was drawn by Kunth, and thus surely a syntype. I designate this specimen as lectotype of *Nephrodium kunthii* Desv. This is a fairly good specimen; I did not photograph it but I studied it and made a note about it. Another specimen in the general herbarium at Paris from Caripe, Herb. Bonpland, and labeled *Aspidium patens* (Morton photograph 4425) is another syntype. These three specimens, the fragment in the Desvaux Herbarium, the one in the Humboldt Herbarium, and the one in the general herbarium are all the same. Desvaux was right; they are not *Aspidium patens* Swartz [*Thelypteris patens* (Swartz) Small] but the nearly related species recognized and described by Christensen as *Dryopteris normalis*, which is common in the southern United States and the West Indies and which occurs also scattered on the Continent from Mexico south probably to Bolivia and Brazil. It is unfortunate that the well-known name *normalis* should disappear, but there is no help for it. For another synonym, see under *Aspidium germanii* Fée (p. 36).

51. PHEGOPTERIS CANESCENS Mett. Abh. Senck. Naturf. Ges. 2:314. 1858=
Ctenitis canescens (Mett.) Morton, comb. nov.
Polypodium canescens Kunze ex Mett. Abh. Senck. Naturf. Ges. 2:314. 1858, pro syn.; Hook. Sp. Fil. 4:262. 1862 (non Blume, 1828).
Polypodium blanchetianum Kunze ex Mett. Abh. Senck. Naturf. Ges. 2:314. 1858, pro syn.
Dryopteris blanchetiana Hieron. Hedwigia 46:344. 1907.
Ctenitis blanchetiana Copel. Gen. Fil. 124. 1947. Illegit.

The type and only specimen originally cited by Mettenius was *Moricand* 2454, from Bahia, Brazil, which actually should be *Blanchet*

2454 (Herb. Moricand). The original *Phegopteris canescens* Mett. is entirely legitimate but it could not be transferred to *Dryopteris*, because of the existence of the prior and different *Dryopteris canescens* (Blume) C. Chr. However, there is no obstacle to the use of the epithet *canescens* under the genus *Ctenitis*. In transferring the epithet *blanchetiana* in preference, Copeland was routinely transferring names as he usually did without checking the synonymy or the availability of prior epithets.

52. PHEGOPTERIS MEMBRANACEA Mett. Fil. Lechl. 2:22. 1859=**Thelypteris membranacea** (Mett.) Tryon, Rhodora 69:7. 1967.
Nephrodium lechleri Hieron. Bot. Jahrb. Engler 34:448. 1904. Syntypes: Azangaro, Peru, *Lechler* 1785 and San Gavan, Peru, *Lechler* 2321. The former is here chosen as lectotype. Hieronymus based his new species on the same two specimens that were the original syntypes of *Phegopteris membranacea* Mett., and thus his species is identical with *P. membranacea* and the epithet *lechleri* superfluous. As pointed out by Maxon & Morton in 1938, Hieronymus misapplied the name *membranacea* to an entirely different plant that formed no part of the original concept of the species.
Dryopteris membranacea C. Chr. Ind. Fil. Suppl. 1:35. 1913.
LECTOTYPE: Azangaro, Peru, *Lechler* 1785 (K) (chosen by Maxon & Morton, Bull. Torr. Bot. Club 65:366. 1938).

53. PHEGOPTERIS NICARAGUENSIS Fournier, Bull. Soc. Bot. France 19:252. 1872=**Thelypteris nicaraguensis** (Fournier) Morton, comb. nov.
Dryopteris nicaraguensis C. Chr. Ind. Fil. 279. 1905.

The type came from Chontales, Nicaragua, *Levy* 460 *bis*. A fragment is in the Christensen Herbarium at the British Museum (Morton photograph 6374). This is one of the commonest species of the section *Goniopteris* in Central America.

54. POLYPODIUM ADIANTOIDES Aublet, Hist. Pl. Guiane 2:962. 1775=**Polybotrya caudata** Kunze.

This species has remained unknown. The excessively brief original description consisted only of "pinnis auriculatis." The type specimen is in the British Museum (Morton photograph 6626). It is *Polybotrya caudata* Kunze. Fortunately, the specific epithet of Aublet, which is not really especially appropriate, cannot be taken up, since Aublet's species is a later homonym of the different *Polypodium adianthoides* Burm. (1768), which appears to be also a dubious species at the present time. Very likely Burmann's type is in Geneva.

55. POLYPODIUM COMPTONIIFOLIUM Desv. Mag. Naturf. Freund. Berlin 5:316. 1811 [as "*comptoniaefolium*"]=**Grammitis trifurcata** (L.) Copel. Gen. Fil. 211. 1947 (*Polypodium trifurcatum* L.).
Polypodium comptonioides Desv. Mém. Soc. Linn. Paris 6:231. 1827. An illegitimate change of name for *P. comptoniifolium*.
TYPE: Bourbon [Réunion], *Commerson* (holotype P, Jussieu Herb. Cat. 1095, Morton photograph 2947).

Although Desvaux cited the locality of his *P. comptoniifolium* as Bourbon, and the label gives the same data, this must be an error, for no species remotely like this has been found since in Bourbon, the present-day Réunion Island, but the type is quite typical of the West Indian *Grammitis trifurcata*. Madame Tardieu must have come to the same conclusion, for she does not mention *P. comptoniifolium* in her treatment of the species of *Grammitis* in Réunion and the other islands of the Madagascarian region.[29]

56. POLYPODIUM CONJUGATUM Poir. *in* Lam. Encycl. Méth. 5:516. 1804=**Polypodium phyllitidis** L. (forma).

TYPE: "Cette plante est originaire des Indes. (V. s. in Herb. Jussieu)." The specimen mentioned in the Jussieu Herbarium (Cat. 1071) (Morton photograph 2934) is indicated as from "Amerique meridionale donné par M. Houston." The original ticket with the name *Polypodium conjugatum* is in the hand of Poiret, and the specimen agrees with the description.

It has apparently been assumed that this is an Old World species, and although it was based on a single specimen it was inexplicably referred by Christensen in the Index Filicum to both *Polypodium phymatodes* and *Drynaria quercifolia*. But as the label indicates, this is actually an American plant received from William Houstoun, very likely one of his own collections from Mexico, Cuba, or Jamaica. The specimen is a teratological (forked and variously lobed) specimen of the common tropical American species *Polypodium phyllitidis* L.

57. POLYPODIUM CORDIFOLIUM Mart. & Gal. Mem. Acad. Brux. 15:31, *t. 4, f. 2.* 1842, non L., 1753=**Tectaria heracleifolia** (Willd.) Underw. Bull. Torr. Bot. Club 33:200. 1906.

TYPE: Antigua, Veracruz, Mexico, June–October 1840, *Galeotti* 6313 (BR, holotype, Morton photograph 5175).

In the Index Filicum, this species is referred to *Aspidium trifoliatum* L., i.e., *Tectaria trifoliata* (L.) Cav. The type shows that it is a juvenile specimen of *T. heracleifolia* with simple unlobed blades. Although juvenile, it is fertile, a fact that doubtless persuaded Martens and Galeotti to consider it different. However, such juveniles are not at all uncommon in this species. *Polypodium cordifolium* L. is an entirely different thing, i.e., *Nephrolepis cordifolia* (L.) Presl.

58. POLYPODIUM EXPANSUM Poir. *in* Lam. Encycl. Méth. 5:523. 1804=**Tectaria incisa** Cav.

TYPE: Based on a specimen from America in the Lamarck Herbarium, Paris. This was referred by Christensen in the Index Filicum to *Aspidium martinicense* Spreng., with a query. I have seen the type, which is marked "No. 127. *Polypodium*, unique. *Polypodium expansum* Dict." (Morton photograph 2664).

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[29] "Les 'Grammitis' de la région Malgache," Notul. Syst. [Paris] 15:421–425. 1959.

The type is the upper part of a frond of typical (glabrous) *Tectaria incisa* Cav., of which *Aspidium martinicense* is a synonym (Cf. C. Christensen, Dansk Bot. Ark. 9(3):14. 1937). There is another specimen in the Lamarck Herbarium (Morton photograph 2665) which is also labeled "*Polypodium expansum* Dict." It was collected (or received) from Sonnerat. There is some error here, because this is an utterly different plant, which does not agree at all with the description of *Polypodium expansum* Poir. Although I have not studied it closely, it is, I believe, *Dryopteris varia* (L.) Kuntze, and must have come from Asia.

59. POLYPODIUM FLABELLIFORME Poir. *in* Lam. Encycl. Méth. 5:519. 1804=**Grammitis flabelliformis** (Poir.) Morton, comb. nov.

Polypodium rigescens Bory ex Willd. *in* L. Sp. Pl. ed. 4, 5:183. 1810.

TYPE: Bourbon (Réunion), *Bory* (presumably in Herb. Willd., B).

This was originally published with the diagnosis "Polypodium fronde angustissima, elongata, pendula; lobis alternis, obtusis. (N)" and the citation of the illustrations "Polypodium aliud pendulum, minimum. Plum. Fil. pag. 68, tab. 87," and "Polypodium lonchitidis folio, angustissima, pendulum. Petiv. Fil. tab. 10, fig. 1." A variety is described: "A. Idem, fronde breviori, lobis longioribus.N" The citation regarding the type is: "Cette plante croît dans la Martinique, sur le tronc des vieux arbres, d'où ses feuilles pendent vers la terre. (V. s. in herb. Juss. & Desfont.)." Thus, it is seen that the species was based on literature references to Plumier and Petiver and on dried specimens in the Jussieu and Desfontaines Herbaria. In such cases there is no doubt that the actual specimens studied should be regarded as the types rather than the figures cited, which were based on material not seen by Poiret.[30]

In the Jussieu Herbarium at Paris there is only one specimen that could be the type. It is labeled "Polyp. flabelliforme Poir. Dict." in the hand of Poiret; it also bears the references to the illustrations of Plumier and Petiver (Morton photograph 2951). This is surely the specimen mentioned in the original description from the Jussieu Herbarium. This sheet is from the island of Bourbon (Réunion) in the Indian Ocean, from the Herbarium of Commerson (which usually means actually collected by Commerson). It is surely the species subsequently described as *Polypodium rigescens* Bory. Very likely the locality "Martinique" in the original description came only from Plumier. Poiret was in error in identifying this Commerson collection with the Plumier plate, for the two are evidently different.

[30] The Plumier illustration quoted is the left-hand plant on the plate, the identity of which is uncertain, but it is one of the small species of the "*Xiphopteris*" group *P. hartii*, *P. knowltoniorum*, *P. serricula*, or *P. taenifolium*, perhaps the latter.

The name *Polypodium flabelliforme* Poir. was erroneously applied in the Index Filicum to a small, delicate species of the Lesser Antilles, especially Guadeloupe, the proper name of which is still uncertain. Mr. George Proctor gave me a manuscript for criticism some time ago (about 1960) in which he attempted to show that the name *Polypodium suspensum* L. applied to this species. The basis of *P. suspensum* is the larger, right-hand plant of Plumier's plate 87. I could not agree and wrote to Mr. Proctor (Jan. 30, 1961) as follows:

> . . . I agree that *suspensum* cannot be a synonym of *asplenifolium* or a near ally. As you say, it must be searched for among the essentially glabrous species. However, it does not seem to me that it really can be *flabelliforme*, and I don't think that the Grenada specimen labelled *tovarense*, of which you have a photograph, can be "*flabelliforme*" either; the segments are of a different shape, acute rather than rounded and fan-shaped (*flabelliforme*). I won't presume to identify the Grenada specimen from the photograph. But it does seem to me that pl. 87 of Plumier, the type of *suspensum*, can be *jubiforme*. You eliminate this from consideration by saying that it has "narrower, nearly exstipitate, downwardly attenuate fronds and relatively narrow, oblong segments," but I can't quite agree. Sometimes the segments are narrow and oblong in *jubiforme*, but this is a variable species and some specimens have the segments relatively broad at base. The illustration does show the blade somewhat reduced at base and with only short stipes. Plumier's illustrations are notoriously inaccurate, and I think that this is as good as might be expected for *jubiforme*. In any case, "*flabelliforme*" is also downwardly reduced and nearly exstipitate. Plumier's description and also his illustration says that the segments have the shape of the front of a shoe or a foot, i.e., a high instep curving down to a narrow toe, in other words the segments are broad at base, acute at apex and curved on the proximal side. This is not at all true of "*flabelliforme*" but is more or less true of *jubiforme*—not all specimens and not all segments, but some. You disregard the disposition of the sori near the apex of the segments, although this is particularly mentioned in the Plumier description and is shown in the illustration. This is characteristic of *jubiforme* and not of "*flabelliforme*." Finally, *jubiforme* is common in Martinique; all collectors have found it, and it would be odd if Plumier had not. The only illustration of Plumier that could be it is this pl. 87. To sum up, it appears to me that there is good reason to believe that *suspensum* is the same as *jubiforme* and the earliest name. The alternative would be to regard *suspensum* as a "sp. dub." and allow it to remain unused for anything.

The following year Mr. Proctor wrote[31] on the identification of *Polypodium suspensum* L., claiming the identification with *P. jubiforme* as his own, and stating that his previous manuscript identifying the species with *P. flabelliforme* had been written with "private misgivings," although certainly none were expressed to me at the time. He further misquotes me as saying "that if the identity of the Linnaean *P. suspensum* could not be clearly settled, it might be better to treat it as a 'nomen ambiguum' than to displace a well-established name," but as indicated above in the quotation from my letter I said nothing of the sort. On the contrary I said that there is good reason to believe

[31] Brit. Fern Gazette 9:77. 1962.

that *suspensum* is the same as *jubiforme* and the earliest name for that species. Mr. Proctor also stated in his note that the type of *P. flabelliforme* represented a different species from Mauritius, without indicating me as the source of his information. I did write to him concerning the type of this species, identifying it with *P. rigescens* Bory, but I certainly did not say that it came from Mauritius; I told him that it came from Bourbon (Réunion), as it does.

60. POLYPODIUM HOSTMANNII Klotzsch, Linnaea 20:397. 1847=**Thelypteris hostmannii** (Klotzsch) Morton, comb. nov.
Dryopteris hostmannii Maxon & Morton, Bull. Torr. Bot. Club 65:369, *t. 14.* 1938.
TYPE: Surinam, *Hostmann & Kappler* 828 (holotype B!, isotypes K, NY).

This is one of the species of *Meniscium*, which I now treat as a section of *Thelypteris*.

61. POLYPODIUM INVISUM Swartz, Prodr. Veg. Ind. Occ. 133. 1788, non Forster, 1786=**Thelypteris invisa** (Swartz) Proctor.
Aspidium invisum Swartz, Journ. Bot. Schrad. 1800²:34. 1801. Considered to be a legitimate new name dating from 1801, and not a transfer of *Polypodium invisum* Swartz. Based on the same type.
Nephrodium invisum (Swartz) Desv. Mém. Soc. Linn. Paris 6:257. 1827. Based on *Aspidium invisum* Swartz.
Lastrea invisa (Swartz) Presl, Tent. Pterid. 75. 1836. Based on *Aspidium invisum* Swartz.
Nephrodium sloanei Baker, *in* Hook. & Bak. Syn. Fil., ed. 2.263. 1874. Based on *Polypodium invisum* Swartz, non Forster, but illegitimate, since the combination *N. invisum* (Swartz) Desv. was prior and correct. Also illegitimate, since a later homonym of *N. sloanei* Presl, 1825.
Dryopteris sloanei Kuntze, Rev. Gen. Plant. 2:813. 1891. A legitimate name, considered not as a transfer of the illegitimate *N. sloanei* Baker, non Presl, but a new name, based on the same type, necessitated by the unavailability of the epithet *invisa* under *Dryopteris* because of the different species *Dryopteris invisa* (Forster) Kuntze.
Dryopteris oligophylla Maxon, Contr. U.S. Nat. Herb. 10:489. 1908. Based on *Polypodium invisum* Swartz, non Forster. Illegitimate, since superfluous, the name *Dryopteris sloanei* Kuntze being nomenclaturally synonymous, legitimate, and available.
Thelypteris oligophylla (Maxon) Proctor, Bull. Inst. Jam. Sci. Ser., 5:62. 1953. Based on *Dryopteris oligophylla* Maxon. Illegitimate, since the earliest available specific epithet was not adopted. All the epithets *Aspidium invisum* Swartz, *Lastrea abrupta* Presl, and *Dryopteris sloanei* Kuntze were available and prior to *Dryopteris oligophylla*.
Thelypteris invisa (Swartz) Proctor, Rhodora 61:306. 1959. To be considered as based on *Aspidium invisum* Swartz.
TYPE: Jamaica, *Swartz*.

In 1786, Forster described one of his collections from Tahiti as *Polypodium invisum* Forster, and two years later Swartz, doubtless unaware of Forster's publication, described one of his own collections

from Jamaica as *Polypodium invisum* Swartz. Strangely enough, by a coincidence these two species from widely separated regions are rather similar, both habitally and taxonomically, belonging to *Dryopteris* subgenus *Cyclosorus* of Christensen. Exactly why both Forster and Swartz considered these innocuous ferns "*invisum*," i.e., hateful or detested, is debatable. Still, later pteridologists who have found it necessary to classify the numerous, close, and impossibly variable species of this group, such as *D. patens*, *D. normalis*, *D. feei*, *D. augescens*, *D. unita*, *D. arida*, *D. ferox*, and so on can perhaps make a guess.

Forster's species, being prior, has properly continued to retain the epithet *invisum*, being usually known as *Dryopteris invisa* (Forster) Kuntze. I have examined the type in the British Museum (Natural History) and found that it agrees with such Tahiti specimens as *Setchell & Parks* 9 and 16, and Wilkes Expedition 7 in the U.S. National Herbarium. Only the lowest pair of veins is truly united in the leaf tissue, the second pair connivent to the sinus. Indusia are present and are long-pilose. The sporangia bear one or occasionally two hairs on the lateral faces. The upper surface is glabrous except along the midrib, but the lower is pilosulous on the costules and veins. The pinnae are only slightly cut, about one-third the way to the midrib or less. By these characters this species may be distinguished from *unita* and allied species. It is found also in the Fiji Islands (Wilkes Expedition) and elsewhere in Polynesia and Melanesia, but its exact range remains to be determined.

According to my present generic concepts in this group, *Polypodium invisum* Forster belongs in *Thelypteris*, subgenus *Cyclosorus*.[32] Unfortunately, it cannot now be transferred to *Thelypteris*, because of the recent publication of the combination *Thelypteris invisa* (Swartz) Proctor for the West Indian species, an unwise action on the part of Mr. Proctor, for now the well-known Old World *invisa* must be renamed, and the name *invisa* transferred to a West Indian and tropical American species, which can only result in confusion. However, there is no help for it.

Thelypteris forsteri Morton, nom. nov.

Polypodium invisum Forster, Fl. Ins. Austr. Prodr. 81. 1786. Type: Tahiti, *Forster* (BM). Not *Thelypteris invisa* (Swartz) Proctor, 1959.

Nephrodium invisum (Forster) Carruthers *in* Seem. Fl. Vit. 362. 1873, non Desv., 1827.

Dryopteris invisa (Forster) Kuntze, Rev. Gen. Plant. 2:813. 1891.

Aspidium invisum (Forster) Christ, Bot. Jahrb. Engler 23:350. 1896, non Swartz, 1801.

Cyclosorus invisus (Forster) Copel. Gen. Fil. 142. 1947.

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[32] Amer. Fern. Journ. 53:153. 1963 [1964].

The American species described originally by Swartz has had an unhappy nomenclatural history. In recent times commonly known as *Dryopteris oligophylla* Maxon, it is allied to *D. normalis*, *D. augescens*, *D. serra*, *D. patens*, and others; it is the giant of the group, well-grown mature plants often being two meters high, with pinnae 30 cm. long or more and 3 cm. wide. The lowest veins are connivent to the sinus but not actually united, for which reason Copeland placed the species in "*Lastrea*," where it is wholly out of place. In its sum total of characters (aspect, texture, basally abrupt leaf-blades, persistent hairy indusia, and so forth), it is closely allied to *D. dentata* and related species, and thus belongs in subgenus *Cyclosorus*.

This West Indian plant can be known as *Thelypteris invisa*, but not with the authority proposed by Proctor, who gave the basionym as *Nephrodium invisum* Desv. (1827). However, the first validation of the epithet *invisum*, by Art. 72 (Note) of the International Code of Botanical Nomenclature, was as *Aspidium invisum* Swartz (1801). Inasmuch as Desvaux cited Swartz' name as the basis for his *Nephrodium invisum*, Proctor's new combination can be considered as valid, with the parenthetical authority changed from Desvaux to Swartz.

The var. *invisa*, with the sori strictly medial, is restricted to the Greater Antilles. The closely related forms of the Continent, ranging from Mexico to Ecuador are referable to:

Thelypteris invisa var. **aequatorialis** (C. Chr.) Morton, comb. nov.
Dryopteris oligophylla Maxon var. *aequatorialis* C. Chr. Dansk. Vid. Selsk. Skrift. [Monogr. Dryopteris] VII, 10(2):189. 1913.

SYNTYPES: Andes, Ecuador, *Sodiro* (C); Santa Jues, Río Pastaza, Ecuador, *Stuebel* 871 (B); Niebli, *Lehmann* 5053 (B); Baños, Río Pastaza, Ecuador, *Spruce* 5296 (Bonaparte Herb., P); Peru, *Schenke* in 1909 (Rosenst. Herb., S); Bolivia, *Bang* 2312 (B, US). As lectotype I choose *Spruce* 5296 (P).

Although similar of course to typical *T. invisa*, this seems to be rather distinct. The distinguishing character of *T. invisa* var. *invisa* is that the basal two or three segments of the lower pinnae are abortive, as well illustrated by Christensen (1913, f. 25). Variety *aequatorialis* has the basal segments smaller, but not aborted; in addition, it is sometimes a smaller plant, with fewer pairs of veins in the segments (10–12 pairs, as contrasted with 15 pairs or more in var. *invisa*), and it is much hairier; the veins, costules, and indusia are densely pilose, and some hairs are borne on the costules and veins of the upper surface, which are glabrous in var. *invisa*. In size and some other respects, var. *aequatorialis* resembles *T. kunthii*, which is lighter green in color, softer in texture, with fewer pairs of veins (5–9 pairs), and which has the bases of the lower pinnae somewhat enlarged rather than contracted.

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Thelypteris invisa var. **pallescens** (C. Chr.) Morton, comb. nov.
Dryopteris oligophylla var. *pallescens* C. Chr. Dansk. Vid. Selsk. Skrift VII, 10(2):188. 1913. A large number (19) of syntypes are cited. I do not have all these at hand. I choose *Eggers* 15037 from El Recreo, Ecuador, as lectotype (U.S. 831342, annotated by Christensen)

The nomenclature has been complicated by a taxonomic problem caused by the fact that a closely allied plant was described from Peru as *Aspidium abruptum* Kunze, i.e., *Dryopteris kunzeana* (Hooker) C. Chr. Christensen stated that this certainly was not specifically distinct from *D. oligophylla*, and named it *D. oligophylla* var. *kunzeana* (Hooker) C. Chr. I have looked into the matter and I must say that I agree. Still, this South American plant can be recognized as varietally distinct. It has the sori slightly but perceptibly supramedial.

Thelypteris invisa var. **kunzeana** (Hook.) Morton, comb. nov.
Aspidium abruptum Kunze, Linnaea 9:93. 1834, non Blume, 1828. Type: Pampayacu, Peru, *Poeppig* in 1829.
Lastrea abrupta Presl, Tent. Pterid. 75. 1836. By Art. 72 (Note) to be considered not as a transfer but as a new name, dating from 1836, for *Aspidium abruptum* Kunze, non Blume.
Nephrodium kunzeanum Hooker, Spec. Fil. 4: 102. 1862. Based on *Aspidium abruptum* Kunze, non Blume, but illegitimate, since Hooker should have adopted the epithet *abrupta* Presl, which was available under *Nephrodium*.
Nephrodium abruptum (Presl) Baker, Syn. Fil. 263. 1868. To be considered as based on *Lastrea abrupta* Presl.
Dryopteris abrupta (Presl) Kuntze, Rev. Gen. Plant. 2:812. 1891. To be considered based on *Lastrea abrupta* Presl, and not a transfer of *Aspidium abruptum* Kunze. A correct name under the genus *Dryopteris*.
Dryopteris kunzeana (Hooker) C. Chr. Ind. Fil. 273. 1905. Illegitimate.
Dryopteris oligophylla Maxon var. *kunzeana* (Hook.) C. Chr. Dansk. Vid. Selsk. Skrift. VII, 10(2):189. 1913.

I have not seen the type, collected by Poeppig, but the following collections agree with the original description and with Christensen's characterization:

Peru: Río Marañon, below Rancho Indiana, Distr. Iquitos, Dept. of Loreto, Jan. 28, 1932, *Mexia* 6462. Lower Río Nanay, Dept. Loreto, May–June 1929, *Ll. Williams* 379. Muña, May 23–June 4, 1923, *Macbride* 3991. La Merced, Dept. Junín, May 29–June 4, 1929, *Killip & Smith* 23542.

Christensen cites also *Spruce* 4066, from Tarapoto, and *Schenke* 47, as well as a collection from Río Balao, Ecuador (*Eggers* 14523).

The South Brazilian *Dryopteris oligophylla* var. *lutescens* C. Chr.[33] seems to me to be doubtfully distinguishable from var. *kunzeana*. It was based on five specimens: Minas Gerais, *Mosen* 2144, 2145; São

[33] Dansk. Vid. Selsk. Skrift VII, 10(2):188. 1913.

Paulo, *Regnell* III, 1448, *Widgren;* and Rio Grande do Sul, *Juergens & Stier* (Rosenst. Exs. 182). I do not designate a lectotype.

62. POLYPODIUM NIGRIPES Hasskarl, Catalogus Plantarum in Horto Botanico Bogoriensi Cultarum Alter 4. 1844=**Tectaria melanocaulis** (Blume) Copeland.

In Christensen's Index Filicum, *Polypodium nigripes* Hassakarl is unplaced and considered a dubious species. In the Rijksherbarium, Leiden, there is a sheet labeled *P. nigripes*, with the number 1718 H.B., the "H.B." standing for Hortus Bogoriensis, which I take to be a Hasskarl collection (Morton photograph 2324). Very likely the holotype is in the herbarium of the Hortus Bogoriensis, but this is presumably an isotype. It is a *Tectaria*, and bears an identification as *Tectaria melanocaulis* (Blume) Copeland by Rosenstock, apparently a correct determination. Another sheet in Leiden, also labeled *P. nigripes*, is also from the Hortus Bogoriensis, and bears the name "Pakoe tjaga"; it is a juvenile leaf, representing the same species *Tectaria melanocaulis* (Morton photograph 2327). Another specimen in Leiden is *Zollinger* 1626 (Morton photograph 2325), from "vom Wasserfall Tjikapundung bei Bandong in der Erde," collected March 17, 1844. Since this is not from the garden at Bogor it cannot be a type, but may very well have been studied by Hasskarl and thus also be authentic; it represents the same species *T. melanocaulis*.

63. POLYPODIUM LEUCATOMOS Poir. *in* Lam. Encycl. Méth. 5:516. 1804=**Polypodium aureum** L. var.

TYPE: Cayenne [French Guiana], *LeBlond* (holotype, Lamarck Herbarium P, Morton photograph 2684).

There has been some doubt about this species, despite the fact that the type is readily available in the herbarium in Paris. In the Index Filicum, Christensen referred it to *Polypodium aureum* L. var., correctly as it turns out. The type is a large frond, lacking stipe and rhizome; the venation is regularly phlebodioid and the sori in two ranks on each side of the costae. In his "Plantae Stuebelianae" in 1909, Hieronymus [34] took up the name *P. leucatomos* Poiret [misspelled "*leucotomos*"] as the correct name for the species long known as *P. decumanum* Willd., without explanation. There is no indication that he saw Poiret's type, and it is unlikely that he did so. *Polypodium decumanum* is allied with *P. aureum*, but has the sori in four to seven rows on each side of the costae. Christensen [35] in the first supplement to the Index Filicum followed Hieronymus in taking up the name *P. leucatomos* in place of *P. decumanum*, erroneously as it now appears.

[34] Hedwigia 48:267. 1909.

[35] Ind. Fil. Suppl. 1:125. 1913.

It has appeared on herbarium labels and occasionally in publications, e.g., by Kramer, Meded. Bot. Mus. Utrecht 124:489. 1954.

64. POLYPODIUM OBTUSILOBUM Desv. Ges. Naturf. Freund. Mag. Berlin 5:317. 1811=**Ctenitis desvauxii** Tardieu-Blot.

Aspidium desvauxii Mett. ex Kuhn, Fil. Afr. 231. 1868. Renaming of *Polypodium obtusilobum* Desv. under *Aspidium*, the epithet *obtusilobum* not being available because of the prior and different *Aspidium obtusilobum* Fée (1857).

Dryopteris obtusiloba (Desv.) C. Chr. Ind. Fil. 280. 1905.

Ctenitis desvauxii Tardieu-Blot, Notul. Syst. 15:82. 1954. Proposed as a new species, with a Latin diagnosis. There is no mention of *Polypodium obtusilobum* Desv. or *Aspidium desvauxii* Mett., nor any mention of the Desvaux type. No type was indicated. Four specimens, all from Mauritius, were cited, of which the first may stand as lectotype: "Bois de l'anse Courtois de la montagne du Corps de Garde, *Boivin*, août, 1849." The identification "*Polypodium thelypteroides* Desv.?" appears on the label, evidently the reason for the choice of the specific epithet "*desvauxii*."

Ctenitis desvauxii (Mett. ex Kuhn) Tardieu-Blot, Notul. Syst. 16:181. 1960. Based on *Aspidium desvauxii* Kuhn and *Polypodium obtusilobum* Desv. Not validly published, because the basionym, although stated, is not fully cited with the place of publication (Code, Art. 33), and also illegitimate, since a later homonym of *C. desvauxii* Tardieu-Blot (1954).

The type was said by Desvaux to be from Madagascar, but this was an error. The holotype is in the Jussieu Herbarium (P), Cat. no. 1115 (Morton photograph 2959), and it definitely says "Ile de France" i.e., Mauritius, Herb. Commerson. This species is apparently known only from Mauritius and not from Madagascar. The epithet *obtusilobum*, although entirely validly published and the oldest, cannot be transferred to the genus *Ctenitis* because of the different species *Ctenitis obtusiloba* (Baker) Ching (Bull. Fan Mem. Inst. Biol. Bot. 8:296. 1938), based on a type from Ceylon.

65. POLYPODIUM PELLITUM Willd. ex Kaulf. Enum. Fil. 89. 1824=**Polypodium lycopodioides** L. Sp. Pl. 1082. 1753.

In the Index Filicum (1906) *P. pellitum* is left as a dubious species, and apparently no one has examined the type and published on its identity since that time. I have studied the type in the Willdenow Herbarium, Berlin; it is sheet no. 19604, collected in Brazil, by Commerson. It represents *P. lycopodioides* L. The blades lack scales, as they should in this species.

66. POLYPODIUM PENNATUM Poir. *in* Lam. Encycl. Méth. 5:535. 1804=**Thelypteris pennata** (Poir.) Morton, comb. nov.

Polypodium megalodus Schkuhr, Kr. Gew. 1:24, *t. 19b*. 1806.

Dryopteris megalodus Urban, Symb. Antill. 4:21. 1903.

Thelypteris megalodus Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:61. 1953.

TYPE: "Amer. Merid.," without collector (holotype P, Morton photograph 4704).

Christensen, in his Monograph of the Genus *Dryopteris*, suggested that *Polypodium pennatum* Poir. was the earliest name for the species that he called *D. megalodus* (Schkuhr) Urban, but he hesitated to take up the name without studying the type. I have seen the type in Paris and it is definitely the same as *megalodus*, which is a distinctive species. There is an isotype in the Persoon Herbarium, Rijksherbarium, Leiden, with the label probably in the hand of Poiret (Morton, photograph 1195). The type locality, other than "Amer. merid.," is unknown, but it is very likely West Indian.

67. POLYPODIUM SERRATUM Aublet, Hist. Pl. Guian. 2:962. 1775=**Bolbitis guianensis** (Aubl.) Kramer, Acta Bot. Neerl. 3:486. 1954.
Asplenium auritum Swartz var. *acutum* Mett. f. *serratum* (Aubl.) Mett. Abh. Senckenb. Naturf. Gesell. Frankfurt 3:147. 1858.
TYPE: French Guiana, *Aublet* (holotype BM, Morton photograph 7464).

Polypodium serratum Aublet (non alior.) has always been a dubious plant. Aublet's original description is too brief:

> . . . fronde simplici; pinnis alternis, serratis.
> Lonchitis minor, pinnis latioribus, leviter denticulatis, superiori latere auriculatis. Sloan. *Hist. Jam. vol. 1. pag. 78. Cat. p. 16. tab. 33. fig. 1.*

The description "simplici" is an error, because simple fronds do not have pinnae, and Aublet describes the pinnae. Aublet tried to identify his specimens, and new species, with previously published descriptions and illustrations by Plumier, Sloane, and others, often incorrectly since his specimens came from French Guiana, and the illustrations cited usually were of West Indian species, mostly from Jamaica or Hispaniola. In this case, the reference to Sloane's illustration of a Jamaica plant is such an error, which has caused a continuing confusion. Sloane's drawing (very poor) is of some species of *Asplenium*, and Mettenius went so far as to identify it with a form of *Asplenium auritum* Swartz, and Posthumus, in his Ferns of Surinam, listed *Polypodium serratum* as a synonym of *Asplenium sulcatum* Lam. Christensen, in his Index Filicum, was much closer when he indicated that *P. serratum* was "*Asplenium* sp. vel *Leptochilus guianensis.*" An examination of the holotype in the British Museum shows that it is indeed *Leptochilus guianensis* (Aubl.) C. Chr., which must now be known as *Bolbitis guianensis* (Aubl.) Kramer, incidentally a name omitted from the new Index Filicum, Supplement IV.

68. POLYPODIUM TRISTE Kunze, Linnaea 9:47. 1834=**Thelypteris tristis** (Kunze) Tryon, Rhodora 69:8. 1967.
Dryopteris tristis Kuntze, Rev. Gen. Pl. 2:814. 1891.

TYPE: Mission Tocache, Huallaga, Peru, *Poeppig* 1959. The original was doubtless destroyed in Leipzig. I did not find any isotypes in the British Museum, or in the herbaria in Paris and Leiden.

This species was not known from Venezuela when Christensen published his monograph of *Dryopteris* in 1913. Knuth listed it in his Initia Florae Venezuelensis, but without noting any specimens; like many of Knuth's records in this work, the inclusion was very likely based on probabilities. A definite Venezuelan record is as follows:

VENEZUELA: Forest 3–4 km. southeast of "Los Patos," north of Río Hacha and north of Río Supamo, 30 km. south of El Manteco, State of Bolívar, alt. 365 m., Aug. 9, 1960, *Steyermark* 98027 (VEN).

69. POLYPODIUM VARIOLATUM Willd. *in* L. Sp. Pl. ed. 4, 5:192. 1810=**Polypodium triseriale** Swartz, Journ. Bot. Schrad. 1800 (2):26. 1801, var.

TYPE: Brazil, communicated by Hoffmannsegg (perhaps collected by Sieber ?) (holotype Willd. Herb., B. sheets 19685 [1–3], photograph of one sheet by Tryon, US).

Mettenius, in his monograph of *Aspidium*,[36] placed "*Polypodium variolatum* Willd. Herb. Spreng." as a synonym of *Aspidium macrophyllum* Swartz, i.e., the present *Tectaria incisa* Cav., and Christensen in the Index Filicum followed him and placed *P. variolatum* Willd. as an undoubted synonym of *Aspidium martinicense* Spreng., another name for the same species of *Tectaria*. Mettenius would hardly have made a mistake of this sort, and so it may be presumed that the specimen labeled *P. variolatum* in the Sprengel Herbarium (present location unknown) really is a *Tectaria*. However, the holotype, which I saw in the Willdenow Herbarium in Berlin, is by no means a *Tectaria*, but a typical *Polypodium* of the section *Goniophlebium*. It has been identified by Hieronymus, probably correctly, as *P. menisciifolium* Langsd. & Fisch., but so far as I can tell at present this species is only a variety or form of the common and widespread *P. triseriale* Swartz (much better known under the later name *P. brasiliense* Poir.). This group of species needs to be critically revised.

70. POLYSTICHUM CYPHOCHLAMYS Fée, Gen. Fil. 279. 1852=**P. echinatum** (Gmelin) C. Chr.

TYPE: Cuba, *Linden* 2175 (holotype P, Morton photograph 4300).

In 1909, Maxon [37] listed *P. cyphochlamys* Fée as a doubtful synonym of *P. triangulum* (L.) Fée, without having seen the type. At that

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[36] Abh. Senckenb. Ges. Frankfurt 2:406. 1858.

[37] Contr. U.S. Nat. Herb. 13:28. 1909.

time he was misidentifying *Polypodium triangulum* L. with a common and widely distributed species of the Greater Antilles with spiny, holly-like pinnae. Later, Maxon [38] looked into the question further and came up with a different answer. Since there is no specimen in the Linnaean Herbarium of *Polypodium triangulum*, the illustration cited by Linnaeus must be taken as the type; this illustration by Petiver was not original but was redrawn from Plumier *t. 72*, which thus becomes the type of *P. triangulum*. The Plumier description and drawing, although the latter is stylized, best represent a species of Hispaniola collected several times by Ekman, Leonard, and Picarda, quite different from the species previously called *Polystichum triangulum*, which now becomes *P. echinatum* (Gmelin) C. Chr. The holotype of *P. cyphochlamys* Fée shows that this species is a synonym of typical *P. echinatum*.

71. POLYSTICHUM KILLIPII Maxon, Contr. U.S. Nat. Herb. 24:53, *t. 20*. 1922=
Polystichum trapezoides (Swartz) Presl, Tent. Pterid. 83. 1836.
Aspidium trapezoides Swartz, Journ. Bot. Schrad. 1800(2):31. 1801. Type: Jamaica, *Swartz* (Isotype B, Willd. Herb. 19749, photograph by Tryon US).

TYPE: One mile below Ipswich, Parish of St. Elizabeth, Jamaica, Apr. 1, 1920, *Maxon & Killip* 1520 (Holotype US).

In his treatment of the West Indian species of *Polystichum* in 1909, Maxon [39] mentioned a collection from Troy, Jamaica (*Underwood* 2837) as possibly representing an undescribed species; this he later described in 1922 as *P. killipii*. In 1909 he considered *Aspidium trapezoides* Swartz as a doubtful synonym of his *P. "triangulum,"* i.e., the present *P. echinatum*, and in describing *P. killipii* he apparently did not again consider the identification of *A. trapezoides*. A study of a photograph of an isotype of *A. trapezoides* shows that Maxon was probably right in considering it (in herbarium) as the same as his *P. killipii*, but a detailed study of the holotype in Stockholm is necessary for a definite decision.

A plant from Cuba (El Yunque, Baracoa, Oriente, *Ekman* 3918, US) is rather poor, but apparently represents *P. trapezoides*, which thus occurs in Cuba as well as Jamaica.

The Cuban species of *Polystichum*, not so numerous as in Hispaniola or Jamaica, may be distinguished by the following key:

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[38] The identification of *Polypodium triangulum* L. Journ. Washington Acad. Sci. 18:582–586. 1928.

[39] Contr. U.S. Nat. Herb. 13:29. 1909.

Key to the Cuban Species of *Polystichum*

Blades pinnate below the middle only, the apex long-attenuate, radicant. **71a. P. rhizophyllum**

Blades fully pinnate or twice-pinnate.
Blades once-pinnate only.
Apex of blades attenuate or flagelliform, proliferous.
Pinnae auriculate at both upper and lower bases.
Pinnae holly-like, with several marginal spines . . **71b. P. ilicifolium**
Pinnae with only the auricles and apex spinescent.
Pinnae coriaceous, with obscure veins, strongly hastate, the auricles and apex strongly spinose . . . . . **71c. P. machaerophyllum**
Pinnae herbaceous, with evident veins, broadly subhastate but not spinescent . . . . . **71d. P. deminuens**
Pinnae not auriculate at the lower base . . . . . **71e. P. decoratum**
Apex of blades not proliferous.
Stipes and rhachises densely and persistently paleaceous. **71f. P. triangulum**
Stipes and rhachises with few scales, these mostly basal.
Blades short, ovate to broadly ovate, long-stipitate . **71g. P. wrightii**
Blades elongate, lanceolate to linear-lanceolate, relatively shorter stipitate.
Superior auricle spinescent, never free . . . . . **71h. P. echinatum**
Superior auricle merely mucronate, not spinescent, often nearly free in mature plants . . . . . **71i. P. trapezoides**
Blades partly or fully twice-pinnate, proliferous.
Apex of blade acute, the proliferous bud borne on the rhachis below the apex . . . . . **71j. P. polystichiforme**
Apex of blade truncate, the bud terminal . . . . . **71k. P. viviparum**

71a. Polystichum rhizophyllum (Swartz) Presl, Tent. Pterid. 82. 1836.

Polypodium rhizophyllum Swartz, Veg. Ind. Occ. Prodr. 132. 1788. Type: Jamaica, *Swartz* (Isotype B, Herb. Willd. 19739, photograph by Tryon, US). Illustrated by Hook. & Grev., Icon. Fil. 1:*t. 59.* 1829.

Polystichum krugii Maxon, Proc. Biol. Soc. Washington 18:215. 1905. Type: Cayey, Puerto Rico, *Sintenis* 2240 (holotype US). The reduction to *P. rhizophyllum* was made by Maxon himself (Contr. U.S. Nat. Herb. 13:36. 1909).

Although common in Puerto Rico, this species is rare in Jamaica and Cuba, and has apparently not been reported from Hispaniola, but it is known from that island by one collection: Morne de La Selle, *Holdridge* 1879 (US).

71b. Polystichum ilicifolium Fée, Gen. Fil. 279. 1852.

Polystichum aquifolium Underw. & Maxon, Bull. Torr. Bot. Club 29:584. 1902 (nom. abort.). A renaming of *P. ilicifolium* Fée from the mistaken idea that this name was invalidated by *P. ilicifolium* (Don) Moore, but the latter combination was not published until 1858, and it is thus the illegitimate later homonym and not *P. ilicifolium* Fée (1852).

TYPE: Santiago, Cuba, *Linden* 2193 (holotype P, Morton photograph 4301). The type is a single frond, without rhizome, quite typical of the species as usually interpreted. The species was illustrated by Fée, Mém. Foug. 6:*t. 6, f. 4.* 1853.

71c. Polystichum machaerophyllum Slosson, Bull. Torr. Bot. Club 40:688, *t. 26.* 1914.

TYPE: Arroyo del Medio, Sierra de Nipe, Oriente, Cuba, *Shafer* 3262 (isotype US).

71d. Polystichum deminuens Maxon, Contr. U.S. Nat. Herb. 24:53, *t. 19.* 1922.

TYPE: Near Josephina, Oriente, Cuba, Nov. 4, 1859, *Wright* 1057 (holotype YU, fragment US).

Known only from the type.

71e. Polystichum decoratum Maxon, Contr. U.S. Nat. Herb. 13:30, *t. 3.* 1909.

TYPE: Farallones de La Perla, near Monte Verde, Oriente, Cuba, *Maxon* 4408 (holotype, US).

Endemic in the Province of Oriente, Cuba, where it is not rare.

71f. Polystichum triangulum (L.) Fée, Gen. Fil. 279. 1852.

Polypodium triangulum L. Sp. Pl. 2:1088. 1753. Type: Based on *Trichomanes folio triangulo dentato.* Pet. fil. 76. *t. 1, f. 10,* an illustration which is a copy of Plumier, Tract. Fil. Amer. *t. 72.* 1705. As mentioned above under *P. cyphochlamys,* Maxon identified the Plumier description and figure with a rather rare species of Hispaniola. From the description, he is probably right, although it would be hard to be sure from the figure alone. An illustration of *P. triangulum* in this accepted sense of Maxon is given by Maxon, Journ. Washington Acad. Sci. 18:583, *f. 1.* 1928.

Although this species is known only from Hispaniola and not from Cuba, it is included here because the epithet *triangulum* has been widely applied to Cuban plants erroneously.

71g. Polystichum wrightii (Baker) C. Chr. ex Maxon, Contr. U.S. Nat. Herb. 16:50. 1912.

Polypodium wrightii Baker *in* Hook. & Bak. Syn. Fil. 304. 1867. Type: Cuba, *Wright* 3924 (holotype presumably K).

Dryopteris sauvallei C. Chr. Ind. Fil. 291. 1905. Based on *Polypodium wrightii* Baker.

Polystichum longipes Maxon, Contr. U.S. Nat. Herb. 13:34, *t. 6.* 1909. Type: Cuba, *Wright* 3924 (holotype US). Although this species is based on the same collection number as *Polypodium wrightii,* and Maxon at the time was ignorant of the existence of *P. wrightii,* his species cannot be considered as nomenclaturally synonymous, since it is based on a different sheet of this collection. Wright's fern collections are notoriously mixed, and it is theoretically possible that Maxon's species is different from Baker's, although in this instance that does not appear to be the case.

An extremely rare endemic, probably still known only from the original collections by Wright. Maxon cites duplicates at GH, NY, YU, and the Sauvalle Herbarium, Havana.

71h. Polystichum echinatum (Gmelin) C. Chr. Ind. Fil. 581. 1906.

Polypodium echinatum Gmelin *in* L. Syst. Nat. ed. 13, 2(2):1309. 1791. Type: Sloane, Voy. Jam. Nat. Hist. 2:*t. 36, f. 4, 5.* 1707. Although Gmelin probably saw only the illustrations cited, the specimens on which the illustrations were based are preserved in the Sloane Herbarium at the British Museum (Natural History), and were seen by Maxon (Journ. Washington Acad. Sci. 18:584. 1928). These can be designated as lectotypes. Although they represent somewhat different forms, Maxon considered them conspecific and that they represented the common species of the Greater Antilles that long passed as *P. triangulum.* Swartz cited these same two figures in his description of his *Aspidium mucronatum,* but his species was based not on these figures but on Jamaican specimens that he had collected and which are preserved in the herbarium at Stockholm; these represent a different species, *Polystichum mucronatum* (Swartz) Presl, which is endemic in Jamaica. A synonym of *P. mucronatum* is *Polystichum struthionis* Maxon, Contr. U.S. Nat. Herb. 13:37, *t. 8, fig. A, B.* 1909, which was based on "*Aspidium mucronatum* Hook. Sp. Fil. 4:9, *t. 216.* 1862, not Sw. 1801" in the mistaken belief that Swartz had based his species on the Sloane illustrations rather than specimens. Maxon's *P. struthionis* should be considered a superfluous name. Even so, it should be typified, something that Maxon did not do. The only specimen seen by Hooker and also cited by Maxon is Jamaica, *Wilson* (K), and this is herewith designated as lectotype of *P. struthionis* Maxon.

Polystichum falcatum Fée, Gen. Fil. 279. 1852. Type: Port-au-Prince, Haiti, *L'Epagnier* (not seen). Referred here on the authority of Maxon.

Polystichum cyphochlamys Fée, Gen. Fil. 279. 1852. See above for a discussion of the type.

71i. Polystichum trapezoides (Swartz) Presl, Tent. Pterid. 83. 1836. See above for a discussion of the type and synonymy.

71j. Polystichum polystichiforme (Fée) Maxon, Contr. U.S. Nat. Herb. 13:35. 1909.

Phegopteris polystichiformis Fée, Gen. Fil. 247. 1852. Type: Monte Líbano, Oriente, Cuba, *Linden* 1874 (isotype BM, Morton photograph 6415).

This is a rare species of Cuba and Jamaica. Maxon did not see a type, but he correctly identified the species with *Wright* 832 from Monte Verde, Oriente, Cuba.

71k. Polystichum viviparum Fée, Gen. Fil. 280. 1852. Type: Oriente, Cuba, *Linden* 1742 p.p.

Polystichum heterolepis Fée, Gen. Fil. 279. 1852. Type: Oriente, Cuba, *Linden* 1742 p.p. (isotype BR, photograph by Weatherby, US).

As noted by Maxon,[40] *P. viviparum* Fée and *P. heterolepis* Fée were founded on portions of the same collection, and the differences noted

[40] Contr. U.S. Nat. Herb. 13:33, *t. 5.* 1909.

by Fée are such as ordinarily obtain between different plants from a single collection. In uniting the two species, Maxon chose the name *P. heterolepis*, without explanation, but doubtless going on "page priority." However, this has nothing to do with the choice between names of the same date. In the Index Filicum, Christensen (p. 588, 1906) chose the name *P. viviparum*, and reduced *P. heterolepis* to synonymy under it (p. 582), and he must be followed.

72. PTERIS CONFLUENS Thunb. Prodr. Pl. Cap. 171. 1800=**Thelypteris confluens** (Thunb.) Morton, comb. nov.

Aspidium thelypteris (L.) Swartz var. *squamigerum* Schlecht. Adumbr. 23, *t. 11.* 1825. Type from Cape Province, South Africa.

Nephrodium squamulosum Hook. fil. Fl. N. Zeal. 2:39. 1855.

Aspidium squamigerum Fée, Mém. Foug. 8:104. 1857.

Thelypteris squamulosa Ching, Bull. Fan Mem. Inst. Biol. Bot. 6:5, 329. 1936.

Thelypteris palustris var. *squamigera* Tardieu, Mém. I.F.A.N. 28:119, *t. 20, f. 7–9.* 1953.

TYPE: Cape of Good Hope, South Africa, *Thunberg* (UPS, seen by Schelpe).

Dr. E. A. C. L. E. Schelpe pointed out recently [41] that *Pteris confluens* Thunb. (1800) is not a synonym of *Pellaea auriculata* (Thunb. Fée, as it is listed in the Index Filicum, but is really the same as the South African *Thelypteris palustris* Salisb. var. *squamigera* (Schlecht.) Tardieu. He saw the type of Thunberg's species in the herbarium at Uppsala. He overlooked the fact that the epithet *confluens* antedates *palustris* by many years. *Polypodium palustre* Salisb., dating from 1796,[42] is twice illegitimate, first because it is a later homonym of *P. palustre* Burm. (1768) and second because it was a superfluous name, being an unnecessary change of specific epithet on transferring *Acrostichum thelypteris* L. (1753) to *Polypodium*. The epithet *palustris* validly dates from *Thelypteris palustris* Schott (1834).[43]

This is a most distressing circumstance. If the South African plant, which occurs also in southern India and China, and also in New Zealand, is considered only varietally different from *T. palustris* Schott, it means that the latter will become a variety of *T. confluens*. This plant is one of the best known ferns of western Europe and the United States, where it is commonly called "Marsh Fern." Until recently it has usually been called *Dryopteris thelypteris* (L.) A. Gray. It is possible that this northern plant really is specifically distinct from the South

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[41] "The identity of some fern types in the Thunberg Herbarium," Journ. So. Afr. Bot. 29:91. 1963. See also "A review of the southern African species of Thelypteris," Journ. So. Afr. Bot. 31:260. 1965.

[42] Prodr. 403. 1796.

[43] Gen. Fil. ad *t. 10.* 1834.

African, and I prefer to consider it so for the present rather than displace the well-known name *T. palustris*. The chief difference seems to be in the presence of small scales along the costae of the pinnae beneath in the South African *T. confluens*. If the European and North American plant is considered eventually only varietally different, it will be a difficult problem to ascertain the oldest varietal name applicable to any form of this plant.

73. PTERIS DOLABRIFORMIS Poir. *in* Lam. Encycl. **Méth.** 5:722. 1804 = **Adiantum villosum** L. Syst. Nat. ed. 10, 2:1328. 1759.

TYPE: Santo Domingo, collector unknown (holotype P, ex Herb. Poiret, Morton photograph 2645, left-hand plant; the right-hand plant mounted on the sheet from the Morne de la Soufrière, Guadeloupe, October 1827, is not a type, but it also represents *A. villosum* L.).

In the Index Filicum *P. dolabriformis* Poir. is placed as a doubtful synonym of *Adiantum pulverulentum* L., but the type, although fragmentary, obviously represents *A. villosum* L. in the usual sense.

74. Pteris macroptera Link, Hort. Reg. Bot. Berol. Descr. 2:32. 1833.

A specimen (Morton photograph 5446) distributed under this name from the Hortus Berolinensis is undoubtedly authentic material, for it quite agrees with the original description. The species was described from material cultivated in the botanical garden in Berlin from material originally received from Brazil. The species is a synonym of the common and widely distributed *Pteris altissima* Poiret, which is filed in most herbaria as *P. kunzeana* Agardh, a later name taken up in the Index Filicum. The venation of this species is characteristic: Along the midribs of the pinnae on both sides are three areoles between adjacent midribs of the segments, two elongate and one short. Allied species such as *P. polita* (*P. propinqua*) and *P. decurrens* normally have just one elongate areole between adjacent costules. The segments are more or less equal at the upper and lower base.

Another species, apparently confined to Brazil, has passed as *P. macroptera*, but it is obviously different. It has distant segments which are very strongly decurrent at the lower base and not surcurrent at the upper. Because of the distance between adjacent midribs of the segments there are several (more than three) areoles along the midrib of the pinna between adjacent segment-midribs. This large species has two available names, the one by Fée being the older.

Pteris angustata (Fée) Morton, comb. nov.[44]

Litobrochia angustata Fée, Crypt. Vasc. Brés. 1:49, *t. 11, f. 1.* 1869. Syntypes from Rio de Janeiro, Brazil, *Glaziou* 2149 and 2310 (not seen; presumably in Paris).

[44] *Pteris angustata* Wallich, List. no. 93. 1828, is a nomen nudum.

Pteris paulistana Rosenst. Hedwigia 46:89. 1906. Type: Rio Grande, São Paulo, *Wacket* 32 (Rosenst. Fil. Austrobras. 344) (isotype US).
RANGE: Rio de Janeiro, São Paulo, Minas Gerais, and Paraná, Brazil.

Other collections in the National Herbarium are:

BRAZIL: RIO DE JANEIRO: Tijuca, *Smith & Brade* 2208; Rio de Janeiro, *Martius* (HBG, Morton photograph 2201). SÃO PAULO: Iguape, *Brade* 8244. MINAS GERAIS: Areponga to Fazenda de Grama, *Mexia* 4244 (distr. as *P. decurrens*). PARANÁ: Serra do Mar, *Dusén* 543a. Without specific locality: *Bowie & Cunningham* 4; *Glaziou* 7952.

75. PTERIS POLYPODIOIDES Poir. *in* Lam. Encycl. Méth. 5:716. 1804=**Thelypteris totta** (Thunb.) Schelpe, Journ. So. Afr. Bot. 29:91. 1963, var. **hirsuta** (Mett.) Morton, comb. nov.
Aspidium unitum var. *hirsutum* Mett. Ann. Lugd. Bat. 1:230. 1864.
Dryopteris gongylodes var. *hirsuta* C. Chr. Dansk. Vid. Selsk. Skrift. VII, 10(2):193. 1913.
Cyclosorus goggilodus var. *hirsutus* Farwell, Amer. Midl. Nat. 12:259. 1931.
TYPE: Brazil, without collector (Lamarck Herb., P, Morton photograph 2755).

In the Index Filicum, *Pteris polypodioides* Poir. is placed as a synonym of *Dryopteris unita* (L.) Kuntze. Probably no recent pteriodologist has critically examined the type, which turns out to be the hirsute variety of the common and widespread species usually known as *Dryopteris gongylodes* (Schkuhr) Kuntze (the "*D. goggilodus*" of some recent authors who believe in blindly following the original spelling, even though that is patently impossible orthographically). When I discovered this, I was intending to abandon reluctantly the well-known epithet *gongylodes* and to propose a new combination based on *Pteris polypodioides* Poir., which has priority, but Dr. Schelpe has recently shown that there is still another earlier name for the species—*Polypodium tottum* Thunb. (1800). He is right in proposing the new combination *Thelypteris totta* (Thunb.) Schelpe to replace *T. gongylodes* (Schkuhr) Small, but it is most unfortunate, because the epithet "*totta*" has been widely used for an entirely different and also widespread species that is correctly known now as *Thelypteris pozoi* (Lagasca) Morton (correct, that is, according to my opinion of the taxonomy; some authors would prefer to call it *Leptogramma pozoi* or *Stegnogramma pozoi*).

Thelypteris totta occurs in two forms, one with the blades essentially glabrous beneath and aften capitate-glandular (the original *Aspidium gongylodes* Schkuhr, the type from British Guiana, usually called *Dryopteris gongylodes* var. *glabra* (Mett.) C. Chr), and one with the pinnae conspicuously pilosulous beneath on the midribs and veins, the blades eglandular, and the indusia hairy (characters shown by the type of *Pteris polypodioides*); the latter is usually called *Dryopteris*

gongylodes var. *hirsuta* (Mett.) C. Chr. These two forms are best considered as varieties provisionally, for although they look very different in extreme specimens, they do seem to be connected by intermediates that are only slightly pubescent; this would be a good problem for cytological and genetical study. Dr. Schelpe did not mention any pubescence on the type of *Polypodium tottum* Thunb., and so it may be assumed that it is essentially glabrous, especially since the hirsute variety apparently does not occur in the region of the Cape of Good Hope, where Thunberg's type came from. The name "var. *glabra*" will disappear, and the typical form should be known merely as var. *totta*. This species has been described many times, and I have assembled over two typewritten pages of synonymy. The more important synonyms (mostly on the authority of the Index Filicum) of var. *totta* are:

Aspidium pohlianum Presl, Delic. Prag. 1:173. 1822. Type from Madeiras, Brazil, Pohl (not seen).

Nephrodium venulosum Desv. Mém. Soc. Linn. Paris 5:255. 1827. Type from "insulis africanis" (not seen).

Hypopeltis propinquoides Bory, *in* Bélanger, Voy. Bot. 2:69. 1833. Type from Java (not seen).

Aspidium ecklonii Kunze, Linnaea 10:546. 1836. Type from South Africa (not seen).

Some of the synonyms of var. *hirsuta* are presumed to be:

Nephrodium propinquum R. Brown, Prodr. Fl. Nov. Holl. 148. 1810. Type from Australia, *Banks & Solander,* in 1770 (holotype BM, Morton photograph 6621).

Aspidium continuum Desv. Ges. Naturf. Freund. Berlin Mag. 5:320. 1811. Based on *Pteris polypodioides* Poir.

Aspidium resiniferum Kaulf. Enum. Fil. 237. 1824. Type from the Hawaiian Islands, *Chamisso* (not seen).

Aspidium venulosum Blume, Enum. 151. 1828. Type from Java, *Blume* (not seen).

Nephrodium paludosum Liebm. Dansk. Vid. Selsk. Skrift. V, 1:275. 1849. Type from San Antonio, Huatusco, Veracruz, Mexico, *Liebmann* 2658 (fragment US).

Goniopteris cheilocarpa Fée, Gen. Fil. 251. 1852. Syntypes from Brazil, *Claussen* 112, *Gardner* 53 (not seen).

Nephrodium inaequilaterum Colenso, Trans. N. Zeal. Inst. 20:229. 1888. Type from New Zealand, *Colenso* (not seen).

The very large plant of southern Brazil, with the pinnae up to 40 cm. long or more may be known as:

Thelypteris totta var. **longipinna** (C. Chr.) Morton, comb. nov.

Dryopteris gongylodes var. *longipinna* C. Chr. Dansk. Vid. Selsk. Skrift., VII, 10(2):194. 1913. There are five syntypes from Brazil, Uruguay, and Paraguay. Since I have not seen all of them, I do not choose a lectotype.

76. **Pteris polita** Link, Hort. Reg. Bot. Berol. Descr. 2:30. 1833.
Pteris propinqua Agardh, Rec. Pterid. 65. 1839.

In his original description of *Pteris propinqua* Agardh quoted *P. polita* Link as a synonym with a query, evidently not being sure enough of Link's species to adopt the name. The syntypes of *propinqua* came from Jamaica (*Bancroft*, *MacFadyn*). Link's *P. polita* has remained in limbo, so to speak, ever since. It was based on plants cultivated in the botanical garden in Berlin from material originally received from Brazil. In the herbarium of the Staatsinstitut für allgemeine Botanik, Hamburg, I found two sheets (Morton photographs 5449, 5450) of *P. polita* that had been collected in the Hortus Berolinensis and which are undoubtedly authentic. They bear the date 1834, which may be the date of collection or the date sent out. The data are similar to those of many other species described by Link in 1833; all have proved to be correctly named and are essentially isotypes. It is evident that Link (probably with Friedrich Otto) collected samples from the hothouses in Berlin of his new species described in his Hortus Regius Botanicus Berolinensis and distributed them widely. The specimens in Hamburg show that *P. polita* Link is truly the same as the later *P. propinqua* Agardh, and therefore the latter name, which has become rather widely known through its adoption in the Index Filicum, must be displaced. The species is widely distributed in tropical America and does grow both in Brazil, the type locality for *P. polita*, and in Jamaica, the type locality for *P. propinqua*.

77. SALVINIA ROTUNDIFOLIA Willd. *in* L. Sp. Pl., ed. 4, 5:537. 1810=**S. auriculata** Aubl. Hist. Pl. Guian. 2:969, *t. 367*. 1775.
TYPE: Brazil, *Hoffmannsegg* (B, Herb. Willd. no. 20250).

The first author to distinguish clearly between two common tropical American species of *Salvinia* was C. A. Weatherby,[45] who pointed out that *S. auriculata* Aubl. had the clusters of four hairs with the hairs united by their tips, and that *S. rotundifolia* Willd. had the hairs completely distinct and tapering at the tip. Unfortunately, he did not see the type of *S. rotundifolia* Willd. Through the courtesy of D. W. Domke, the director of the herbarium at the Botanisches Museum, Berlin-Dahlem, I was privileged to study the holotype. It is a good specimen, which is obviously the same as *S. auriculata* Aubl., closely matching *Samuels* 73, from Surinam. It is unfortunate that the name *S. rotundifolia* must disappear into synonymy, but there is no help for it. As a matter of fact, the name was considered a synonym of *S. auriculata* by J. G. Baker and by Christensen, a

[45] "A further note on Salvinia," Amer. Fern Journ. 27:98–102. 1937.

conclusion also agreed with by Miss J. Kopp in her dissertation on *Salvinia*. According to Kopp, the species that Weatherby and others following him [46] have called *S. rotundifolia* should be called *S. minima* Baker,[47] a species that was based on a collection (*Fritz Mueller* 479) from Santa Catarina, Brazil, which is presumably at the Royal Botanic Gardens, Kew, but may be in the British Museum.

78. SCHIZAEA PENICILLATA Humb. & Bonpl. ex Willd. *in* L. Sp. Pl. ed. 4, 5:86. 1810 = **S. pennula** Swartz, Syn. Fil. 150, 379. 1806.

Recent authors have followed Prantl [48] in recognizing two species of *Schizaea* section *Digitata* [*Actinostachys* Wallich as a genus] from northern South America, one *S. pennula* Swartz, with nonstriate spores, and *S. penicillata* Humb. & Bonpl., with striate spores; aside from the spore difference, the latter species has smaller and fewer sorophores. However, *S. penicillata* was originally proposed merely as a change of name for *S. pennula* Swartz, and was unnecessary, and therefore was superfluous and illegitimate. Martius correctly placed *S. penicillata* as a synonym of *S. pennula*, and described the second of the species mentioned above as *S. subtrijuga* Mart.,[49] which is a correct name; the types of *S. subtrijuga* were collected by Martius from Arara-Coara and Cupati, Amazonas, Colombia.

79. TRICHOMANES AERUGINOSUM Poir. *in* Lam. Encycl. Méth. 8:76. 1808 = **Hymenophyllum aeruginosum** (Poir.) Carm. Trans. Linn. Soc. [London] 12:513. 1818.

Trichomanes hirsutum sensu DuPetit Thouars, Esq. Fl. Trist. d'Acunha 34. 1804, non L.

Hymenophyllum capillare Desv. Mém. Soc. Linn. Paris 6:333. 1827. Type: Tristan d'Acunha Island, *DuPetit Thouars* (presumably P, not seen).

Hymenophyllum fulvum van den Bosch, Nederl. Kruidk. Arch. 5(3):196. 1863. Type: Tristan d'Acunha, collector unknown [but surely DuPetit Thouars] (holotype in Herb. Berlin [not seen], fragment of holotype L, Morton photographs 1551, 2532). Van den Bosch originally gave the locality as Madagascar, but subsequently wrote on the sheet "Tristan d'Acunha, *Thouars*"; his plants are thus very likely a part of the same collection as the type of *H. capillare*.

TYPE: Tristan d'Acunha Island, *Bory de St. Vincent* (holotype P, Morton photograph 4546).

The name *Hymenophyllum capillare* Desv. has commonly been applied to a species of Madagascar, Réunion, and tropical Africa.

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[46] Dr. Elias de la Sota has published several valuable papers on *S. auriculata*, *S. rotundifolia* sensu Weatherby, and other species. See Darwiniana 12:465–520. 1962; 612–623. 1963.

[47] Journ. Bot. Brit. & For. 1886:98.

[48] Untersuchungen zur Morphologie der Gefässkryptogamen 2:132. 1881.

[49] Icon. Crypt. Vasc. 117. 1834.

However, the type came from the little island of Tristan d'Acunha in the South Atlantic Ocean, and only one species of this alliance grows there, the previously and generally recognized species *H. aeruginosum* (Poir.) Carm., of which *H. capillare* must be a synonym. If the African and Mascarene Island plants should prove to be different,which may very well be true, then the proper name for them will be *H. pendulum* Bory, which was based on a plant collected on Réunion Island by Bory de St. Vincent.

80. TRICHOMANES MUSCOIDES Swartz, Journ. Bot. Schrad. 1800 (2):95. 1801=
Trichomanes hymenoides Hedwig, Fil. Gen. Sp. *t. 3, f. 3.* 1799.

Swartz gave a description of his *T. muscoides* but cited "Hedw. icon. fil." as a synonym, and later the exact illustration of Hedwig intended is indicated by Swartz in his Synopsis Filicum (p. 142. 1806) as *Trichomanes hymenoides* Hedwig. Therefore, *T. muscoides* Swartz should by the Code be considered as a renaming of *T. hymenoides*, superfluous and therefore illegitimate.

The typification of these names is of some interest. Hedwig indicated his species as "Habitat . . ." thus showing that he did not know the origin of his material. Swartz sent many of his specimens from Jamaica to Hedwig who illustrated them, under the names assigned by Swartz. It is likely that Swartz sent a specimen of a Jamaican species to which he had assigned the name *T. muscoides*, and that this label became lost. Hedwig retained the specimen, and described it as a new species, *T. hymenoides*. Swartz, writing just about the same time or a year later, realized what had happened, and considered his own name *T. muscoides* as having priority, and so he adopted it and placed the Hedwig plate in synonymy. This would have seemed right to him, but it is not in accordance with our current Code of Nomenclature. The Swartz specimen from Jamaica at Stockholm would be authentic, technically an isotype rather than a holotype. The holotype of Hedwig could not be located by Wessels Boer in his recent treatment of *Trichomanes* section *Didymoglossum*,[50] and so the plate was considered as typifying the species. It is likely that the holotype is actually in the herbarium in Geneva; it could be identified by comparison of the plants with Hedwig's illustration. Boer (1962) considered *T. muscoides* Swartz as a heterotypic synonym of *T. hymenoides*, and based on the Swartz collection at Stockholm, but as indicated above I believe it should be considered a homotypic synonym, a renaming of *T. hymenoides* rather than a new species independently described. A specimen collected by Swartz in Jamaica in the Rijksherbarium, Leiden (Morton photograph 2416) would probably be an isotype.

[50] Acta Bot. Neerl. 11:306. 1962.

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THE GENUS GRAMMITIS IN ECUADOR

By CONRAD V. MORTON

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THE GENUS GRAMMITIS IN ECUADOR

CONRAD V. MORTON

Introduction

The Ecuadorian collections of the late Dr. Wendell H. Camp contained a rather large number of specimens of the fern genus *Grammitis* as I currently recognize it. The present paper is the result of the study of this material, which included a number of rarities, among them several undescribed species.

For the past 35 years or more, I have been following Dr. William R. Maxon in recognizing an extremely large, very diverse genus *Polypodium*. Maxon was, in turn, following Christensen, Hieronymus, and other noted fern students. Evidence, however, has been accumulating in recent years that there are two major groups of species—those centering around the true *Polypodium*, as typified by *P. vulgare* L., and those belonging to *Grammitis* Swartz and some closely related small genera. It seems that there is no alternative now to recognizing *Polypodium* and *Grammitis* as distinct genera; in fact some authors go so far as to place these genera in different families, as Polypodiaceae and Grammitidaceae, although this is an extreme view to take of plants that, in some instances, can hardly be distinguished from one another. Copeland in his monograph of *Ctenopteris* (which I consider to be *Grammitis*), in at least one instance included specimens of a true *Polypodium* and a *Grammitis* under a single name (*Ctenopteris truncorum*), and he also noted that *Polypodium pectinatum*, *P. plumula*, and their allies were probably referable to *Ctenopteris*, although more recent studies have shown that these species are truly *Polypodium*, closely mimicking "*Ctenopteris*" in habit.

Polypodium and *Grammitis* differ in all parts of the plants—vegetative fronds, sporangia, spores, and gametophytes. Possibly the most uniform and easily observable difference is in the spores, those of *Polypodium* being monolete and those of *Grammitis* trilete; however, not all species have been investigated from this point of view. If this character really holds, it is fortunate; that it is not necessarily a fundamental character is shown by the fact that both monolete and trilete spores may occur in species unquestionably in the same genus, as in *Vittaria*, *Antrophyum*, and *Dicranopteris*. The spores of *Gram-*

mitis are said to be green and those of *Polypodium* not green. A still more easily observable character is found in the type of hairs on the vegetative parts. In *Grammitis*, these hairs are spreading, rigid, dark, elongate, and one-celled; such hairs seem to be always found on the stipes, and are also frequently found on the blades, especially on the margins or among the sporangia. In *Polypodium*, such hairs (usually called setae) are absent; hairs, if present, are either short and glandular or flaccid and septate. The rhizome scales in *Polypodium* are usually of a more "clathrate" type, with large lumina and narrow walls, although such scales are found also in some species of *Grammitis*. Although the fronds of some species of *Polypodium* are scaleless (such as *P. vulgare*), they often have scales on the stipes, midribs, or leaf surfaces. According to Kenneth A. Wilson,[1] the sporangial stalk in *Polypodium* is two-celled at the base and that of *Grammitis* one-celled. Alma G. Stokey and Lenette R. Atkinson have published a paper [2] on the gametophytes of *Grammitis* in which some differences from *Polypodium* have been shown (1958, p. 402): "The bulbous basal cell or cells, or the mass or plate, giving rise to the filament, the bead-like cells of the filament, the growth of the filament by 'Budding,' the protracted filamentous stage, and the characteristic fragmentation of the filament" in *Grammitis*. The gametophytes of *Polypodium* are cordate and have the typical "polypodioid" type of development.

The genus *Grammitis* Swartz was described [3] as follows: "*Capsulae* in lineolis rectis, sparsis. *Indusia* nulla. Origo vocis a γραμμη, *linea*. . . ." This was intended to be contrasted with *Polypodium* L., which had the following diagnosis: "Capsulae in puncta subrotunda sparsa, congestae absque *Indusio*." Thus, *Grammitis* included those species with the sporangia scattered in a straight line, whereas *Polypodium* had them congested in a rotund sorus. Although this character is not a real distinction, for some species properly included in *Grammitis* have rotund sori and conversely some undoubted Polypodiums, such as *P. astrolepis* Liebm., have elongate sori, the species included by Swartz did form a reasonably cohesive group. They were *G. linearis* Swartz [now *G. graminea* (Swartz) Copel.], *G. marginella* (Swartz) Swartz, *G. lanceolata* Swartz [now *Loxogramme lanceolata* (Swartz) Presl], *G. serrulata* (Swartz) Swartz [based on *Acrostichum serrulatum* Swartz, now called *Xiphopteris serrulata* (Swartz) Kaulf. by some authors], *G. graminoides* (Swartz) Swartz [*Acrostichum graminoides* Swartz, now *Cochlidium graminoides* (Swartz) Baker], and *C. myosuroides* (Swartz) Swartz [based on *Polypodium*

[1] "The sporangia of three problematic species of Polypodium," Amer. Fern Journ. 49:147–151. 1959.

[2] "The gametophyte of the Grammitidaceae, Phytomorphology" 8:391–403. 1958. See also, Alma G. Stokey, "Polypodium pectinatum and P. plumula—Polypodiaceae or Grammitidaceae?," Amer. Fern Journ. 49:142–146. 1959.

[3] *In* Journ. Bot. Schrad. 1800 (2):17. 1801.

myosuroides Swartz, called *Xiphopteris myosuroides* (Swartz) Kaulf. by some authors]. Thus, all the species are still retained in *Grammitis* or referred to the closely allied groups *Loxogramme*, *Cochlidium*, and *Xiphopteris*.

There was, of course, no original designation of a type for the genus *Grammitis*, nor were there any comments by Swartz indicating that he had any particular species in mind as being more "typical" than another. The designation of a lectotype is of importance, since although the original six species are undoubtedly allied, they are sufficiently different to have been referred to different genera. Copeland [4] merely states: "The first species listed is *G. linearis*, the same author's *Polypodium gramineum*, Prod. (1788) 130. This, being its first species, and being retained in it here, as it has been by all authors except J. Smith who have maintained the genus, must be its type species." As often occurs, however, Copeland's typifications are based on false premises. Very few authors in the past and probably none at present consider that the first species listed has any more claim to be the lectotype of a new genus than any of the others. In fact, the International Code of Nomenclature (1961 ed., p. 64, in the "Guide for the determination of types") specifically states: "Designation of a lectotype should be undertaken only in the light of an understanding of the group concerned. Mechanical systems, such as the automatic selection of the first species or specimen cited . . . should be avoided as unscientific. . . ." In the case of *Grammitis*, John Smith [5] excluded this first species, *G. linearis*, from the genus *Grammitis*, calling it *Lomaphlebia*; for the purposes of typification, it does not matter that the character used by Smith in segregating this new genus may not be considered of generic significance. Smith specifically typified *Grammitis* on *G. australis* R. Brown, but since this was not one of the original species of the genus it is not a possible choice; however, Smith did keep one of the original species in the genus, *G. marginella*. Christensen [6] followed this up by definitely selecting *G. marginella* as the type of the [subsection] *Grammitis*, recognizing also a [subsection] *Lomaphlebia*, with type *G. graminea*. This must, therefore, be considered as a definite choice of *G. marginella* as lectotype of *Grammitis*.

It is a rather unfortunate fact that none of the six original species of *Grammitis* are really representative of most of the species of the genus as it is currently recognized. Strangely enough, although these are rather numerous, they were not known in the time of Swartz. The type species *G. marginella* is no exception; it has the blades with

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[4] Phil. Journ. Sci. 80:93. 1951.
[5] Hist. Fil. 182. 1875.
[6] Ind. Fil. XLIX. 1906.

a conspicuous black border, merely a border and not a marginal vein, for the real veins end some distance within the margin. This is a peculiar character, but there are no other differences. Even Copeland, whose generic concepts in this group are certainly narrow, did not separate this group of species from *Grammitis*, but called it *Grammitis* subg. *Melanoloma*.[7] No type was specifically designated, and, therefore, *G. marginella* Swartz is here designated lectotype. This group of about 14 species, of both the Old and New World, does not occur in Ecuador. It must now be called sect. *Grammitis*, of which subg. *Melanoloma* is a synonym.

Since the name *Grammitis* must now be applied to the small group of species typified by *G. marginella*, another sectional name must be found for the bulk of the species that have commonly been called *Grammitis*. A possible name is *Grammitis* sect. *Chilopteris* Presl,[8] which included originally the three species *G. billardieri*, *G. linearis* [i.e. *graminea*], and *G. marginella*. Christensen,[9] by listing this as a complete synonym of [subsect.] *Grammitis*, effectively chose *G. marginella* as type, and thus sect. *Chilopteris* remains a synonym of sect. *Grammitis*. The next possible name, and the one that is correct, is *Grammitis* sect. *Grammitastrum* Fourn.,[10] which was based on the two species *Polypodium pseudoaustrale* (Fourn.) Fourn. and *P. lasiosorum* (Blume) Hook. The former species, which is based on *Grammitis pseudoaustralis* Fourn.,[11] is here designated lectotype; it is much the more suitable, for it was well known to Fournier, whereas he may have misidentified *P. lasiosorum*.

The late E. B. Copeland published revisions or monographs of *Grammitis*,[12] *Xiphopteris*,[13] and *Ctenopteris*,[14] of varying worth. The *Grammitis* paper is creditable and typical of Copeland's previous monographic works—fairly good taxonomic judgments combined with unusable keys, no descriptions, and a lack of definiteness in statements of range. The *Xiphopteris* paper is brief, and actually only an adaptation of Maxon's previous work on the species allied to *Polypodium serrulatum* [15] and *P. trichomanoides*,[16] with the addition of several new species, most of which had been previously segregated by Maxon (as species of *Polypodium*). The *Ctenopteris* paper, undertaken when Copeland was at an advanced age, is much the poorest of

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[7] Phil. Journ. Sci. 80:253. 1951.
[8] Tent. Pterid. 208. 1836.
[9] Ind. Fil. LIX. 1906.
[10] Ann. Sci. Nat. [Paris] V, 18:282. 1873.
[11] Bull. Soc. Bot. France 16:423. 1869.
[12] "Grammitis," Phil. Journ. Sci. 80:93–267, pls. 1–6, figs. 1–108. 1951.
[13] "The American species of Xiphopteris," Amer. Fern Journ. 42:41–52, 93–110. 1952.
[14] "Ctenopteris in America," Phil. Journ. Sci. 84:381–470, pls. 1–16. 1955.
[15] "Notes upon Polypodium duale and its allies," Contr. U.S. Nat. Herb. 17:398–406. 1914.
[16] "Polypodium trichomanoides and its American allies," Contr. U.S. Nat. Herb. 17:542–557. 1916.

any of Copeland's published works, being replete with errors of all sorts—typographical, certainly, but more importantly in morphological observations and in taxonomic judgments. It is essentially unusable. The species are distributed among 10 groups, but these groups are not named, not keyed, and only briefly or not at all characterized or described. I have noted below an instance of what is essentially the same species that Copeland has placed under three different names in three different groups. A restudy of the American species is much needed; the present paper is the beginning of such a study.

Copeland attempted to maintain *Grammitis*, *Xiphopteris*, and *Ctenopteris* as distinct genera, *Grammitis* being defined as having the fronds simple or lobed less than halfway to the midrib, *Xiphopteris* with lobed to pinnatifid fronds with the veinlets simple or with a single branch, and *Ctenopteris* with pinnatifid fronds, the segments with pinnate veins. Since there are no other differences, these are "one-character" genera, and this one character an essentially insignificant one. The division of the frond (simple as opposed to pinnatifid) has never been considered a generic character in ferns, apart from other differences. And the difference between having one vein branch and several of them is only correlated with having the lobes short or elongate. These ferns vary from having no lateral vein-branches, to having one, two, several, or many. Copeland realized these affinities very well, but chose to recognize the three genera as a matter of convenience. To me, it is more convenient to group them together as a coherent genus. For the purpose of classifying the species it may be convenient to group the species in corresponding "sections," with the realization that these sections may not represent natural phylogenetic units.

Systematic Treatment

Grammitis Swartz

The system of American *Grammitis* that I adopt is:

Grammitis Swartz, *in* Journ. Bot. Schrad. 1800(2):17. 1801.
Sect. Grammitis (Lectotype: *Polypodium marginellum* Swartz).
Grammitis subg. *Melanoloma* Copel. Phil. Journ. Sci. 80:253. 1951 (Lectotype: *Polypodium marginellum* Swartz, Prodr. Veg. Ind. Occ. 130. 1788).
Sect. Grammitastrum Fourn. Ann. Sci. Nat. [Paris] V, 18:282. 1873 (Lectotype: *Grammitis pseudoaustralis* Fourn. Bull. Soc. Bot. France 16:423. 1869).
Grammitis subg. *Grammitis* sensu Copel.

Sect. Cryptosorus (Fée) Fourn. Ann. Sci. Nat. [Paris] V, 18:282. 1873 (Lectotype: *C. blumei* Fée, based on *Polypodium obliquatum* Blume).[17]

Ctenopteris auctt.[18]

Sect. Xiphopteris (Kaulf.) Presl, Tent. Pterid. 208. 1836 (Type: *Acrostichum serrulatum* Swartz.)

Xiphopteris Kaulf. Berlin Jahrb. Pharm. 1820:35.

Key to the Species of Grammitis in Ecuador

Fronds entire or lightly repand (sect. *Grammitastrum*).
- Rhizome not paleaceous. Veins forked . . . . . **1. G. jungermannioides**
- Rhizome with minute scales at apex, these more or less hidden among the numerous hairs.
  - Veins forked . . . . . **2. G. yarumalensis**
  - Veins simple . . . . . **3. G. sprucei**

Fronds lobed to pinnatisect.

Segments with only a costa or this with a single anterior veinlet (sect. *Xiphopteris*).
- Costa of the segments unbranched.
  - Fertile part of the frond subentire, the sterile part toothed or lobed less than halfway to the costa.
    - Sporangia borne on the costa as well as on the base of the veins, thus confluent; rhizomes elongate; sterile part of the blade merely toothed, the fertile part short and contracted . . . **4. G. serrulata**
    - Sporangia borne only on the base of the veins, not confluent; rhizomes short, erect; sterile part of the blade lobed, with deltoid segments, the fertile part elongate and tail-like . . . . . **5. G. jamesonii**
  - Fertile and sterile parts of the blades alike, deeply pinnatifid, the lobes oblong, narrowed from the base. Stipes stout, erect; rhizome scales ciliate . . . . . **6. G. caucana**
- Costa of the segments with a single anterior branch (veinlet), this often subbasal.
  - Rhizome scales not setose on the margins, sometimes with a very few short, several-celled, glandular hairs. Blades deeply lobed, densely setose, long-stipitate . . . . . **7. G. apheloleپis**
  - Rhizome scales setose on the margins, the setae stiff, spreading, one-celled, eglandular.
    - Blades nearly or quite exstipitate, decurrent as a wing on the stipe, lobed less than halfway to the costa, conspicuously setose throughout . . . . . **8. G. truncicola**
    - Blades obviously stipitate, deeply lobed nearly to the costa, the lobes oblong, slightly gibbous [19] on the upper margin. **9. G. blepharolepis**

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[17] Fée had only two species in his genus *Cryptosorus: C. dionaea* and *C. blumei*. The genus was distinguished primarily, as indicated by the generic name chosen, by the sunken sori, a character well shown in *C. blumei* (i.e. *Polypodium obliquatum* Blume) but not or hardly in *C. dionaea*, which is considered to be a synonym of *Polypodium venulosum* Blume. Therefore, *C. blumei* is the logical choice of lectotype.

[18] The question of the publication of *Ctenopteris* has been discussed recently elsewhere (Amer. Fern Journ. 56:65–68. 1966).

[19] The term "gibbous," i.e., hunch-backed, is used to describe a slight hump or lobe on the anterior margin of some of the larger segments of these ferns; it is an indication of the forking of the vein.

Segments with a costa, this with pinnate veinlets (sect. *Cryptosorus*).
Veinlets forked. Epiphytes.
Fronds not setose beneath (except slightly on the midrib beneath in *G. crispata*); rhizome scales not ciliate; blades lobed to pinnatifid but not pinnatisect.
Fronds white-ceraceous beneath, not at all setose. Segments elongate, not fully confluent, auriculate at the upper base . . **10. G. farinosa**
Fronds not white-ceraceous beneath.
Veins free or a few casually anastomosing; blades with a short, entire decurrent base; sori superficial, mostly elongate, without setae intermixed with the sporangia; blades not setose on the midrib beneath, sometimes with a few marginal setae.
Blades with an accessory veinlet arising from the costa; basal superior veinlet running toward and nearly reaching the sinus; blades deeply pinnatifid, the larger ones with a costal wing only ca. 1 mm. wide on either side . . . . . **11. G. eminens**
Blades with no veinlets arising from the costa apart from the main lateral veins; basal superior veinlet not nearly reaching the sinus; blades shallowly lobed to pinnatifid, the costal wing always broad . . . . . **12. G. trifurcata**
Veins more or less regularly anastomosing to form a series of aeroles along the midrib; blades with an elongate entire basal portion; sori impressed, mostly round, sparsely setiferous; blades sparsely setiferous on the midrib beneath, copiously ciliate . **13. G. crispata**
Fronds more or less setose beneath; rhizome scales ciliate; blades pinnatisect, the segments free from each other, not connected by a continuous wing, more surcurrent than decurrent.
Rhizome scales eglandular-ciliate; segments acute, mostly twice as long as broad, evidently crenate-undulate, glabrous above, setose beneath . . . . . **14. G. semiadnata**
Rhizome scales glandular-ciliate; segments rounded, mostly 1.5 times as long as broad, entire or lightly undulate, sparsely setose above near the margin and apex, glabrous beneath . . . **15. G. intricata**
Veinlets simple, not forked.
Sporangia pilose or setose. Pendent elongate epiphytes (or rarely saxicolous), softly hairy (or merely setiferous-margined in *G. alfarii*); rhizome scales ciliate (or absent in *G. alfarii*).
Blades (or some of them) once- or twice-forked. Plants sometimes saxicolous at high elevations . . . . . **16. G. heteromorpha**
Blades not forked.
Blades (or some of them) bipinnate. Plants always epiphytic. **17. G. variabilis**
Blades simply pinnate or only pinnatisect.
Rhizome scales absent; segments strongly unequal-sided at base, strongly gibbous or humped at upper base . . . **18. G. alfarii**
Rhizome scales present; segments more or less equal-sided, not gibbous.
Pinnae 3–10 mm. long.
Pinnae usually 6–10 mm. long; white hydathodes none or inconspicuous on the upper surface; blades usually more than 12 cm. long.
Rhachis without coarse, dark stellate hairs; veins mostly only 2 pairs . . . . . **19. G. senilis**

Rhachis with some dark, coarse, stellate hairs mixed with the soft white ones; veins 3 or 4 pairs . . **20. G. dependens**

Pinnae usually 3–6 mm. long; white hydathodes present or none; blades usually less than 12 cm. long.

White hydathodes present and conspicuous on the upper surface; segments oblong, not much or not at all narrowed toward the base . . . . . **21. G. subtilis**

White hydathodes none; segments obviously narrowed at the base above . . . . . **22. G. subflabelliformis**

Pinnae longer, up to 45 mm. long.

Marginal hairs all solitary; hairs of the rhachis beneath solitary; hairs all rather coarse and stiff . . . **23. G. lehmanniana**

Marginal hairs mostly paired; hairs of rhachis beneath often partly fasciculate; hairs mostly soft and silky.

Sporangia with only one short hair or many of them hairless; plants sparingly hairy; blades pectinate, the segments close . . . . . **24. G. laxa**

Sporangia all with hairs, these usually 2 or more and often elongate; plants densely hairy; blades with rather distant segments.

Segments with 9–14 pairs of veins (and usually also sori), elongate, usually over 20 mm. long.

Hairs of rhachis beneath all pale, even the fasciculate ones . . . . . **25. G. lanigera** var. **lanigera**

Hairs of the rhachis beneath (or some of them) coarser, darker, and fasciculate, the fascicle often somewhat stalked and thus forming a "stellate" hair.

25a. G. lanigera var. **stella**

Segments with 2–7 pairs of veins (and usually sori), shorter, under 18 mm. long . . . . . **26. G. cultrata**

Sporangia glabrous.

Blades (or some of them) once- or twice-forked. Epiphytes (or saxicolous at high elevations); plants soft-hairy . . . **16. G. heteromorpha**

Blades not forked.

Blades (or some of them) bipinnate. Soft-hairy epiphytes.

17. G. variabilis

Blades pinnate, or rarely pinnate-pinnatifid.

Segments ascending at an acute angle, narrow and elongate, long-decurrent at the base. Epiphytes.

Blades pinnatifid only, the segments connected by a narrow wing. Rhachis above green and glabrous; segments entire.

27. G. subsessilis

Blades fully pinnate.

Pinnae subentire. Rhachis more or less viscid-puberulous.

28. G. jamesonioides

Pinnae crenulate to pinnatifid.

Rhachis above with numerous, short, white, stiff hairs; pinnae merely crenulate . . . **29. G. pseudocapillaris**

Rhachis above with a few, conspicuous, elongate, dark setae; pinnae pinnatifid . . . . . **30. G. myriophylla**

Segments spreading horizontally.
Stipes densely short-pubescent. Blades not setulose; rhizome scales ciliate; rhizomes erect, short; texture firm; veins obscure; segments fully adnate but not confluent.
Middle segments 10–20 mm. long; epiphyte . . **31. G. major**
Middle segments ca. 6 mm. long, relatively broad; terrestrial. **32. G. tunguraguae**
Stipes with sparse or numerous setiform hairs, not short-pubescent.
Rhachis hirtous or setose above. Plants epiphytic (or occasionally apparently saxicolous or terrestrial in *G. anfractuosa*, *G. taxifolia*, *G. leucosticta*, and *G. semihirsuta*).
Plants spreading by delicate, radicant, rootlike, stolon-like rhizomes. Blades small and delicate. **33. G. anfractuosa**
Plants not stoloniferous. Segments 3 times as long as broad or longer.
Rhizome scales not ciliate; hydathodes without lime incrustations above. Segments elongate; veins 6–15 pairs; stipes stout, 0.7–1 mm. in diameter.
Lateral veins dark and visible; segments narrow and elongate, with parallel sides, obtuse at apex, with abundant, pale brown setae on the lower surfaces, the margins usually plane, the texture rather thin. **34. G. taxifolia**
Lateral veins immersed, hardly visible; segments shorter, acutish, the margins incurved, with dark, numerous or few setae, the texture thick.
Stipes up to 3.5 cm. long, glabrate; segments sparingly setose . . . . . **35. G. firma**
Stipes up to 11 cm. long, densely setose; segments densely dark-setose . . . . . **36. G. vernicosa**
Rhizome scales ciliate, sometimes sparingly so; hydathodes with obvious lime-dots on the upper surface.
Plants lax, the stipes delicate, 0.2–0.4 mm. in diameter; veins 3–6 pairs, immersed, not visible. Segments with dark setae on the surface; rhizome scales dark, with dark cilia . . . . . **37. G. pichinchensis**
Plants coarser, the stipes (0.5) 0.7–1.6 mm. in diameter; veins often more numerous (few in *G. cuencana*).
Veins only 2–4 pairs; segments short and broad; stipes short, 1–2 cm. long . . . **38. G. cuencana**
Veins more numerous; segments elongate; stipes usually longer.
Veins 4–8 pairs, visible but not obvious. Dark setae present on the surfaces of the segments, usually none on the margins; segments more or less gradually narrowed from a broad base; stipes 2.5–11 mm. long.
Rhizome scales blackish, with dark cilia. **39. G. pichinchae**
Rhizome scales dark brown, with pale brown cilia. **40. G. attenuatissima**

Veins more numerous, (5) 8–20 pairs, usually dark and readily visible. Rhizome scales *very* sparsely ciliate; stipes elongate, 7–25 cm. long.
Veins (5) 8–11 pairs; segments more or less gradually narrowed from a broad base. Dark setae very sparse on the surfaces and margins. . . . . **41. G. leucosticta**
Veins usually more numerous, 8–20 pairs; segments elongate, with more or less parallel sides.
Dark setae numerous and short on the surfaces; cilia of the rhizome scales weak and spreading. . . . . **42. G. alsopteris**
Dark setae absent on the lower surfaces, very few on the upper margin; cilia of the rhizome scales rigid, appressed-ascending. . . . . **43. G. semihirsuta**

Rhachis glabrous above or nearly so. Rhizome scales not ciliate.
Plants epiphytic. Midrib immersed, not or scarcely visible.
Rhizomes slender, ca. 1 mm. in diameter. Setae usually sparse, except among the sporangia . . **44. G. rigens**
Rhizomes thicker, 1.5–2.5 mm. in diameter.
Black setae present on the surfaces of the fertile segments; rhizome scales without hairlike tips. **45. G. pseudonutans**
Black setae present only on the rhachis beneath and among the sporangia; rhizomes scales with elongate hairlike tips only one cell thick. **46. G. sodiroi**

Plants saxicolous or terrestrial, mostly rigid and erect. Segments mostly not more than twice as long as broad.
Rhizomes slender, 0.9–1.1 mm. in diameter (excluding the scales).
Midribs of the segments dark and prominulous; blades up to 24 cm. long. Stipes up to 5 cm. long, 0.5 mm. in diameter; segments truncate, obtuse, 5–6 mm. long and 4 mm. broad. . . . . **47. G. wolfii**
Midribs of the segments immersed in the leaf-tissue, hardly visible; blades usually much less than 24 cm. long.
Rhizomes always very widely creeping, with distant fronds. Stipes elongate, 2–6 cm. long, slender, and wiry; segments usually about twice as long wide . . . . . **48. G. flabelliformis**
Rhizomes often shorter, with closer fronds.
Segments mostly about 1.5 times as long as wide; stipes very slender (0.2–0.4 mm. in diameter), mostly only 1–2 cm. long. **49. G. peruviana**
Segments mostly about as long as broad, very thick; stipes stouter, often more elongate. **50. G. moniliformis**

Rhizomes thicker, 1.5–5 mm. in diameter, excluding the scales.
Segments triangular from a broad base . **51. G. rosarum**
Segments broadly oblong to semicircular.
Plants large and coarse, mostly 25–35 cm. long; stipes ca. 1 mm. in diameter . . **52. G. assurgens**
Plants smaller, mostly less than 20 cm. long; stipes usually ca. 0.5 mm. in diameter.
50. G. moniliformis

1 **Grammitis jungermannioides** (Klotzsch) Ching, Bull. Fan Mem. Inst. Biol. Bot. 10:240. 1941.
Polypodium jungermannioides Klotzsch, Linnaea 20:373. 1847. Type: Mérida, Venezuela, *Moritz* 312 (presumably B).
Grammitis repanda Kunze ex Mett. Fil. Lechl. 1:9. 1856. Illegitimate renaming of *Polypodium jungermannioides* Klotzsch.
Polypodium sprucei var. *furcativenosa* Hieron. Bot. Jahrb. Engler 34:499. 1904. Syntypes: Near Putumayo, on Río Balsayacu, Cordillera de Pasto, Colombia, *Lehmann* 654 (isosyntype US). Chilcasco, Guatemala, *Salvin & Godman.*
Polypodium sprucei var. *costaricensis* Christ, Repert. Sp. Nov. Fedde 8:17. 1910. Type: Volcán de Barba, 2,200 m., Costa Rica, *Brade* 296 (isotype NY).

Range: Jamaica; Guatemala to southern Colombia.
Habitat: Epiphytic.
This species has not yet been found in Ecuador, but it may very well occur there. Its characters were discussed by Maxon in detail.[20]

2. **Grammitis yarumalensis** (Hieron.) Proctor, Bull. Inst. Jam., Sci. Ser. 5:36. 1953.
Polypodium yarumalense Hieron. Bot. Jahrb. Engler 34:499. 1904. Type: Yarumal, Colombia, *Lehmann* 7390 (isotype US).

Range: Jamaica, Hispaniola, Panama, and Colombia.
Habitat: Epiphytic.
No Ecuadorian collections are known, but they are to be expected. These small epiphytes are easily overlooked.

3. **Grammitis sprucei** (Hook.) J. Smith, Hist. Fil. 181. 1875.
Polypodium sprucei Hook. Second Cent., pl. 10. 1860. Type: Tarapoto, Peru, *Spruce* 4746 (isotype US).

Range: Known only from the type.
This minute fern should be searched for in Ecuador, among mosses and hepatics on tree trunks in dense moist forests at middle elevations.

4. **Grammitis serrulata** (Swartz) Swartz, Journ. Bot. Schrad. 1800 (2):18. 1801.
Acrostichum serrulatum Swartz, Prodr. Veg. Ind. Occ. 128. 1788. Type: Jamaica, *Swartz.*

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[20] Proc. Biol. Soc. Washington 51:35, 36. 1938.

Xiphopteris serrulata Kaulf. Enum. Fil. 85. 1824.
Polypodium serrulatum Mett. Fil. Hort. Lips. 30. 1856, non *P. serrulatum* Swartz (1801).
Xiphopteris extensa Fée, Mém. Foug. 11:14. 1866. Type from Guadeloupe, *L'Herminier*. Non *Polypodium extensum* Forst. (1786).
Polypodium duale Maxon, Contr. U.S. Nat. Herb. 16:61. 1912. Based on *Acrostichum serrulatum* Swartz, non *Polypodium serrulatum* Swartz.

Range: Common throughout the American tropics, and also in Mauritius and tropical Africa.

Habitat: Creeping on tree trunks, or occasionally on rocks, mixed with mosses and hepatics, from sea-level to 1,300 m.

Ecuadorian specimens examined: Between Baños and Mera, Prov. Napo-Pastaza, *Mexía* 6966. El Sajado, on Río Santiago, Prov. Concepción, *Mexía* 8449. Road between Quito and Santo Domingo, Prov. Pichincha, *Haught* 3219. Eastern slope of the cordillera, between Chontal and Santa Elena, on trail from Sevilla de Oro to Mendez, Prov. Santiago-Zamora, *Camp* E–809.

5. Grammitis jamesonii (Hook.) Morton, comb. nov.
Xiphopteris jamesoni Hook. Second Cent. Ferns pl. 14. 1861. Type: Andes of Quito, Ecuador, *Jameson* (K!).
Polypodium serrulatum var. *strictissimum* Hook. Sp. Fil. 4:175. 1862. Based on *X. jamesonii* Hook.
Polypodium serrulatum var. *major* Mett. Ann. Sci. Nat. [Paris] V, 2:249. 1864. Based on *X. jamesonii* Hook.
Polypodium jamesonii Jenman, Bull. Dept. Jam. 4:112, 1897, non Mett. 1883.
Polypodium serrulatum var. *jamesonii* Krug, Bot. Jahrb. Engler 24:125. 1897. Based on *X. jamesonii* Hook.
Polypodium strictissimum Hieron. Bot. Jahrb. Engler 34:501. 1904.
Polypodium strictissimum f. *minus* Hieron. Hedw. 44:85. 1905. [as "*minor*"] Type: Quito, Ecuador, *Cuming* 5 (presumably B).

Range: Venezuela, Colombia, and Ecuador, at elevations from [1,500?] 1,800 to 3,400 m.

Habitat: Epiphytic on mossy tree trunks, or sometimes on rocks at the higher elevations.

Ecuadorian specimens examined: Along trail between Río Clavadero and the ridge 10 miles south of Las Toldadas, east of Cayambe Peak, Prov. Imbabura, *Wiggins* 10499. Boggy area east of Cayambe Peak, Prov. Imbabura, *Wiggins* 10422. Páramo and sub-páramo area north and northwest of the Páramo del Castillo, 6–8 km. NNE of Sevilla de Oro, Prov. Azuay, *Camp* E–5131.

6. Grammitis caucana (Hieron.) Morton, comb. nov.
Polypodium caucanum Hieron. Bot. Jahrb. Engler 34:503. 1904. Type: Río Dagua, Dept. Cauca, Colombia, *Lehmann* 3257 (holotype B, not seen).
Xiphopteris caucana Copel. Amer. Fern Journ. 42:98. 1952.

Range: Reported by Copeland from Nicaragua to British Guiana and Ecuador.

Habitat: Terrestrial or epiphytic, at elevations from 700 to 2,300 m.

Ecuadorian collections seen: None.

The only other species with simple veins that is likely to occur in Ecuador is *Grammitis delitescens* (Maxon) Proctor (*Polypodium delitescens* Maxon, Bull. Torr. Bot. Club 32:74. 1905; Contr. U.S. Nat. Herb. 17: 403, pl. 12, fig. 10. 1914), which is common in Jamaica, and occurs also in Central America; it has been reported from Colombia. It is a much more delicate plant, with the lamina not setose as in *G. caucana*. Maxon did not definitely designate a type; the lectotype chosen by Copeland (Amer. Fern Journ. 42:52. 1952) is Jamaica, *Maxon* 1513 (US).

7. Grammitis apheloleپis Morton, sp. nov. PLATE 1

Planta epiphytica; rhizoma breve erectum ca. 2 mm. diam. basibus stipitium exclusis, apice paleaceum, paleis pallide brunneis, anguste vel late lanceolatis, 2–3 mm. longis, 0.6–1.0 mm. latis, apice abrupte angustatis et subcuspidatis, margine integris, non setoso-ciliatis hinc inde pilis minutis, ca. 70 μ longis et 10 μ latis, septatis flaccidis capitato—glandulosis praeditis, basi ca. 14 cellulis latis, cellulis subquadratis vel rectangularibus, 55–130 μ longis, 45–55 μ latis, parietibus valde incrassatis; frondes caespitosae, 10–20 cm. longae, numerosae, stipitatae, stipitibus brunneis, 1.5–4 cm. longis, 0.3–0.5 mm. diam., dense setosis, setis 2–2.5 mm. longis, late patentibus unicellularibus, pilis minutis intermixtis nullis; laminae lineares, 7–14 cm. longae, 7–10 mm. latae, pinnatifidae, rhachi supra immersa dense setosa, subtus elevata, setosa, ala costali angusta 0.25–0.75 mm. lata, segmentis crassis, 18–35-jugis, late oblongis, 4–5 mm. longis, medio ca. 2 mm. latis, ascendentibus, apice rotundatis, margine superiore gibbosis, utrinque dense setosis, setis brunneis rigidis 2–2.5 mm. longis; venae unifurcatae; sori dorsales basi venulae anticae grandes orbiculares, non setosi, non paraphysati; annulus ex ca. 13 cellulis constitutus; sporae globoso—tetraedricae, 32–43 μ diam., sublaeves.

Type in the U.S. National Herbarium, no. 2,080,287, collected near the laguna on Páramo del Castillo, on the crest of the Eastern Cordillera on the trail between Sevilla de Oro and Mendez, Province of Azuay, Ecuador, Aug. 29, 1945, at 9,000–11,000 ft. elevation, by W. H. Camp (no. E–5107).

Paratypes (all Ecuador): Páramo and sub-páramo area north and northwest of the Páramo del Castillo, Prov. Azuay, 10,000–11,200 ft. alt., Aug. 31, 1945, *Camp* E-5139 (US); between Huagrarancha and Loma de Galápagos, Prov. Azuay, 3,140–3,505 m. alt., July 9, 1943,

Steyermark 53464 (US); near lower margin of páramo, eastern slopes of Cayambe Peak, Prov. Imbabura, 11,200 ft. alt., July 16, 1944, *Wiggins* 10,412 (US); ridge about 10 km. south of Las Toldadas, east of Cayambe Peak, Prov. Imbabura, 10,650 ft. alt., July 15, 1944, *Wiggins* 10,402 (US).

8. Grammitis truncicola (Klotzsch) Morton, comb. nov.

Polypodium truncicola Klotzsch, Linnaea 20:374. 1847. Type: Colonia Tovar, Venezuela, *Moritz* 252 (isotype US).

Polypodium truncicola var. *major*, Klotzsch, loc. cit. Type: *Moritz* 252. Klotzsch divided *P. truncicola* into two varieties: *major* and *minor*, the former of which must be considered as the typical variety, as was done by Copeland (Amer. Fern Journ. 42:102. 1952).

Polypodium truncicola var. *minus* Klotzsch, loc. cit. [as "*minor*"]. Type: Mérida, Venezuela, *Moritz* 333 (isotype US).

Polypodium andinum Hook. Second Cent., pl. 6. 1847. Syntypes: Banks of Río Hondacha, Andes of Quito, Ecuador, *Jameson* 780 K!, and Mount Picote, near Moyobamba, Peru, *Nilson* (*Spruce* 4780 K!). The Jameson specimen, presumably at Kew, is here designated lectotype.

Grammitis andina Ching, Bull. Fan Mem. Inst. Biol. Bot. 10:240. 1941.

Xiphopteris truncicola Copel., Amer. Fern Journ. 42:101. 1952.

Range: Costa Rica, Venezuela, Colombia, Ecuador, and Peru, from sea level (in western Colombia) to 2,300 m. elevation.

Habitat: Epiphytic in dense and damp forests.

Ecuadorian specimens examined: Apparently known in Ecuador only from the Jameson specimen cited above as lectotype of *Polypodium andinum*.

Since the species *P. truncicola* and *P. andinum* were both published in 1847 and the exact date of publication is doubtful, Copeland's decision to adopt *truncicola* must be followed. This species is distinctive because of the fronds being merely shallowly lobed and not deeply pinnatifid.

9. Grammitis blepharolepis (C. Chr.) Morton, comb. nov.

Polypodium gracillimum Hieron. Hedw. 48:250, pl. 12, fig. 18. 1909, non Copel. (1905). Between Quito and Mindo, Ecuador, *Stuebel* 747 (B, not seen).

Polypodium blepharolepis C. Chr. Ind. Fil. Suppl. 1:58. 1913. Based on *P. gracillimum* Hieron., non Copel.

Xiphopteris blepharolepis Copel. Amer. Fern Journ. 42:109. 1952.

Range: Venezuela, Colombia, Ecudador, and Peru [fide Copeland], at low to middle elevations.

Habitat: Epiphytic in dense forests.

Ecuadorian specimens examined: Known in Ecuador only from the type.

A related species found at low elevations in the Departments of Cauca and El Valle in Colombia that will probably be found in northern Ecuador is *Grammitis* ***daguensis*** (Hieron.) Morton, comb. nov.

[*Polypodium daguense* Hieron. Bot. Jahrb. Engler 34:504. 1904; type: Río Dagua, Dept. Cauca, Colombia, *Lehmann* 1951 (isotype US)]. It can be distinguished by the segments not being at all gibbous. Still more closely similar in its gibbous segments, but differing in having entire and not setulose-margined rhizome scales is *Grammitis trichomanoides* (Swartz) Ching, which is primarily West Indian but which occurs scatteringly elsewhere. *Polypodium undulatum* Fourn. (1872) (non Willd., 1810) was based in part on *Jameson* 537 from Ecuador, which I have not seen but which may represent *G. trichomanoides*.

10. Grammitis farinosa (Hook.) Morton, comb. nov.

Polypodium farinosum Hook. Icon. Pl. 10: pl. 947. 1854. Type: "On the trunk of an old tree at the eastern ascent of the Cordillera of Quito [Ecuador], where the forests commence; rare;" *W. Jameson* (K!, fragment US).

Ctenopteris farinosa Copel. Phil. Journ. Sci. 84:470. 1955.

Range: Colombia and Ecuador.

Habitat: Epiphyte, at elevations from 2,500 to 3,500 m.

Ecuadorian specimens examined: Eastern side of Mount Tunguragua, Prov. Tunguragua, *Rimbach* 25.

11. Grammitis eminens Morton, sp. nov. PLATE 2

Planta epiphytica; rhizoma breve, perspicue paleaceum, paleis pallide flavis, lanceolatis, ca. 3 mm. longis et 0.5 mm. latis, gradatim longe acuminatis, apice non piliformibus, clathratis, basi ca. 7-cellulis latis, margine subundulatis, non ciliatis, cellulis subrectangularibus magnis, ca. 175–250 μ longis, 50–70 μ latis, parietibus crassis pallide luteis; frondes subcaespitosae 4–8, 14–43 cm. longae, verisimiliter subdimorphae, steriles breviter stipitatae, stipitibus 1–5 cm. longis quam frondibus multo brevioribus, ca. 0.7 mm. diam., teretibus, non costatis, longe et molliter setosis, setis 1.5–2 mm. longis, ca. 20 μ latis, unicellularibus, late patentibus, pallide brunneis, setis brevioribus rigidis nullis; lamina sterilis 10–20 cm. longa, 12–24 mm. lata, pinnatifida, basi cuneata, apice acuminata, rhachi immersa late alata, ala basi 1 mm. lata, supra latiore, segmentis 20–30-jugis, ascendentibus, latis, usque ad 13 mm. longis, 3.5–5 mm. latis, basi adnatis non auriculatis, apice rotundatis, margine integris, textura crassis, supra viridibus glabris, hydathodis nullis, subtus pallidioribus, non ceraceis, fere glabris, in costa sparsissime setosis, setis elongatis curvatis paucissimis, margine in sinubus pilis minutis glandulosis sparse dissitis; frondes fertiles longe stipitatae, stipite 1/3 longitudinis laminae vel lamina fere aequali vel longiore, 5.5–18 cm. longo, 0.8–1.4 mm. diam., lamina quam sterili latiore, 14–22 cm. longa, 3–6 cm. lata, segmentis lanceatis, 16–23-jugis, maximis 5.5 cm. longis et 5–7 mm.

medio latis; venulae pinnatae, immersis, in segmentis utrinque obscuris, 9–22-jugae, ascendentes, subbasaliter furcatae, ramis margine non attingentibus, ramis venarum basalium non raro apice anastomosantibus itaque areolam formantibus, venula basalis superior fere ad sinus attingens, venula altera ex costa excurrens, furcata, ramulis saepe anastomosantibus; sori paullo submediales, dorsales, in ramula antica venularum, subrotundi, receptaculo paullo elongato; sporae sphaerico-tetraedricae, triletae, 34–39 μ diam., laeves.

Type in the New York Botanical Garden, collected in the páramo and sub-páramo area north and northwest of the Páramo del Castillo, ca. 6–8 km. NNE of Sevilla de Oro, Province of Azuay, Ecuador, at 10,000–11,200 ft. elevation, Aug. 31, 1945, by W. H. Camp (no. E–5169).

Paratypes: Near the laguna at Páramo del Castillo, crest of the eastern cordillera in the trail between Sevilla de Oro and Méndez, Province of Azuay, Ecuador, at 9,000–11,000 ft. elevation, August 29, 1945, by W. H. Camp (no. E–5102) (NY, US).

12. Grammitis trifurcata (L.) Copel. Gen. Fil. 211. 1947.

Polypodium trifurcatum L. Sp. Pl. 1084. 1753. Type: Martinique, Plumier, Tract. Fil. pl. 138.

Polypodium trifurcatum L. var. *brevipes* Hieron. Bot. Jahrb. Engler 34:500. 1904. Syntypes: Quebrada de Imbi, Río Cuaiquer, Cordillera de Pasto, Colombia, *Lehmann* 77; Farallones de Cali, Colombia, *Lehmann* 1977; Cordillera west of Cali, Colombia, *Lehmann* 7664 (isosyntype US).

Range: West Indies; Surinam and Venezuela to Bolivia, at elevations from 600 to 2000 m.

Habitat: Epiphyte in dense, wet forests.

Ecuadorian specimens examined: Río Suguibi, *Rimbach* 27. Río del Cinto, on the southern slopes of Mount Pichincha, *Stuebel* 735.

Although Copeland placed this species in *Grammitis* in his restricted sense, it is out of place there. The alliance seems to be with the species placed by Copeland in the "*curvata*" group of *Ctenopteris*.

13. Grammitis crispata (J. Smith) Morton, comb. nov.

Ctenopteris crispata J. Smith, *in* Seem. Bot. Voy. Herald 227, pl. 48. 1854. Syntypes: Isla de Cacagual, southern Darien, Panama, and Bay of Chocó, Colombia, *Seemann* 995K!

Polypodium crispatum Hook. Sp. Fil. 5:1. 1864, non L. (1753).

?*Polypodium trichosorum* Hook. Second Cent., pl. 12. 1860. Type: Forests of Archedona, Andes of Quito, Ecuador, *Jameson* 349.

Glyphotaenium crispatum J. Smith, Hist. Fil. 77, pl. 2. 1872.

?*Polypodium ecostatum* Sodiro, Crypt. Vasc. Quit. 308. 1893. Type: Forests of Los Colorados, Ecuador, *Sodiro*.

Polypodium goniopteroides C. Chr. Ind. Fil. 188. 1905; 530. 1906. Based on *Ctenopteris crispata* J. Smith, non *P. crispatum* L. (1753).

Range: Southern Panama and Colombia, probably south to Ecuador.

Habitat: Epiphytic.

If the above synonymy is correct, this species is represented in Ecuador by the types of two supposed new species, neither of which was originally associated with *Ctenopteris crispata* J. Smith. In the "Index Filicum" both are recognized as species. Copeland suggested that *Polypodium ecostatum* might be the same as his *Glyphotaenium crispatum*.

14. Grammitis semiadnata (Hook.) Morton, comb. nov.

Polypodium semiadnatum Hook. Icon. Pl. 10, pl. 948. 1854. Type: Pilzhum, Andes of Quito, Ecuador, 3,600 m., *Jameson* (K, not seen).
Ctenopteris semiadnata Copel. Phil. Journ. Sci. 84:458. 1955.

Range: Known definitely only from Ecuador. The Colombian specimens referred here by Copeland may be different.

Habitat: Epiphyte, or pendent on sides of sphagnum hummocks, at elevations from 3,000 to 3,600 m.

Ecuadorian specimens examined: Papallacta, Prov. Pichincha, 3,400 m., 1918, *Mille*. San Gabriel, Prov. Carchi, "in silva prim. pr. reg. 'páramo'," *Holmgren* 902. Boggy ciénagas 1–4 miles south of Las Toldadas, east of Cayambe Peak, Prov. Imbabura, 3,090 m., *Wiggins* 10511.

15. Grammitis intricata Morton, sp. nov. PLATE 3

Planta epiphytica; rhizoma erectum, breve, ca. 1 cm. longum, vix 2 mm. diam., paleaceum, paleis fuscis lanceolatis ca. 1.8 mm. longis, 0.4 mm. latis, 9 vel 10 cellulis latis, subobtusis, margine paullo glanduloso-pilosis, pilis brevibus crassis, obtusis, ca. 50 μ longis, 20 μ latis, clathratis, cellulis anguste rectangularibus, ca. 100 μ longis, 40 μ latis, parietibus crassissimis, luminibus angustis; frondes subfasciculatae, 25–30 cm. longae, laxae pendulae, pinnatae, stipitibus quam laminis multo brevioribus, gracilibus fuscis, 3–7 cm. longis, 0.5–0.7 mm. diam., deorsum teretibus, sursum vix alatis, parce setulosis, setis gracillimis patentibus 1.5–2 mm. longis unicellularibus, pilis 2-vel 3-septatis minutis ca. 0.5 mm. longis apice glanduliferis sparse intermixtis, rhachi gracili basi non alata, apice vix alata, fusca, supra dense brunneo-setosa, setis usque ad 3 mm. longis unicellularibus, subtus setosa atque capitato-glandulosa, pilis minutis septatis; laminae lineares, 20–26 cm. longae, 13–20 mm. latae, fere ubique pinnatae, basi paullo decrescentes, apice obtusae non pinnatifidae; pinnae 28–35-jugae, alternae, ovatae, 8–10 mm. longae, 5–7 mm. latae, horizontaliter patentes, basales distantes semiadnatae, superiores ubique adnatae, apice rotundatae, margine integrae vel leviter undulatae, textura herbaceae, vix crassae, supra setis paucissimis elongatis

marginem et apicem versus praeditae, subtus glabrae, margine parce longe setoso-ciliatae; venae immersae obscurae, costa flexuosa, venulis 3-jugis, gracilibus, omnibus infra medium furcatis vel basalibus bis furcatis, liberis, marginem non attingentibus; sori superficiales, 3-jugi, apicales in ramulo antico venarum, magni rotundi ca. 1.75 mm. diam., non setosi, non paraphysati; annulus ex ca. 15 cellulis compositus; sporae sphaerico-tetraedricae triletae, ca. 33 μ diam., fere laeves.

Type in the U.S. National Herbarium, no. 2,204,844, collected in the Cordillera Oriental, at Guamani Pass, east of Pifo, Province of Pichincha, Ecuador, Nov. 10, 1944, at 3,900 m. elevation, by Joseph A. Ewan (no. 16436). Ewan's note on the label says: "In rather deep shade of bosque thickets, the old fronds persisting to form a heavy mat beneath the current live fronds, serving to hold moisture."

Grammitis semiadnata, definitely known only from Ecuador, is a close relative. The shape and pubescence is distinctive. Copeland places this species in this group "*meridensis*," but it is hardly well placed there, for the frond is not truncate at the base, as that group is characterized.

16. Grammitis heteromorpha (Hook. & Grev.) Morton, comb. nov.

Polypodium heteromorphum Hook. & Grev. Icon. Fil. 1, pl. 108. 1829. Type: Mount Pichincha, Prov. Pichincha, Ecuador, *Jameson* K!

Ctenopteris heteromorpha Copel. Phil. Journ. Sci. 84:412. 1955.

Range: Mexico to Peru.

Habitat: In Ecuador rupicolous at higher elevations, 3,500 to 4,500 m., in Colombia epiphytic on trees on the borders of páramos, 3,000 to 3,600 m.

Ecuadorian collections examined: Volcán Antisana, Prov. Pichincha, 4,000–4,500 m., *Anthony & Tate* 282 (US). Mount Pichincha, Prov. Pichincha, 4,000 m., *Mille* (US); ibid., 4,500 m., *Stuebel* 730 (US); ibid., 4,400 m., *Firmin* 576. Mount Carihuayrazo, Prov. Tungüragua, 4,200 m., *Asplund* 8479 (US). Cayambe Peak, Prov. Imbabura, 4,050–4,350 m., *Little & Parades* 6837 (US). Cubillín, Valley of Alao, 3,500 m., *Rimbach* 76 (US). Without specific locality, *Sodiro*, *Mille*, *Couthouy* (all US).

17. Grammitis variabilis (Mett.) Morton, comb. nov.

Polypodium variabile Mett. ex Kuhn, Linnaea 36:133. 1869. Syntypes: New Granada, *Purdie*K!, and Ecuador, *Jameson*K!

Range: Colombia to Peru.

Habitat: On rocky cliffs in páramos, 3,000 to 4,200 m. elevation.

Ecuadorian specimens examined: Mount Atacatzo, Prov. Pichincha, 3,000 m., *Mille* (US).

Although reduced to a synonym of *C. heteromorpha* by Copeland, this species appears recognizable to me, differing in having the blades not forked, but rather regularly bipinnate.

18. Grammitis alfarii (Donn. Smith) Morton, comb. nov.

Polypodium alfarii Donn. Smith, Bot. Gaz. 33:262. 1902. Type: Sierra Alta de Navarro, Province of Cartago, Costa Rica, 2,000 m., May, 1901, *Alfaro* 73 (Donn. Smith 8063) (US).

Polypodium oligosorum Mett. ex Kuhn, Linnaea 36:132. 1869, non Klotzsch (1847). Syntypes: Venezuela, *Moritz* 460, *Fendler* 208, *Karsten* 10.

Rhizome epiphytic, short, slender, ca. 1 mm. in diameter, scaleless; fronds subfasciculate, crowded, 8–10, 8–13 cm. long; stipes 10–14 mm. long, very slender, only 0.1–0.2 mm. in diameter, blackish, densely long-setose; blades linear, 8–15 mm. broad, attenuate to base and apex, light green, very thin and flaccid in texture, pinnatisect, the rhachis dark above and glabrous, paler beneath and sparingly setose; segments 16–38 pairs, alternate, 3–8 mm. long, 3–5 mm. broad at base, subtriangular, the apex obtuse or rounded, the base fully adnate but twice as long adnate on the superior side as on the inferior, rounded at the upper base, short-decurrent at the lower, the lower margin somewhat sigmoid, the upper gibbous with a conspicuous hump at the base extending about half the length of the pinna, the surfaces glabrous, the margin with sparse long (0.4–0.5 mm.), dark brown setae; veins dark, near the lower surface, easily visible, not nearly reaching the margin, the midvein with 2 branches on the upper side, the lower branch elongate and extending up into the hump, sterile, the upper reduced to a short, fertile spur, on the lower side with only one branch, a short fertile spur; white lime dots not present on hydathodes above; sori 2 to a pinna normally, subcostular, borne on the apices of the short distal and proximal spurs, rotund; sporangia numerous, long-setose, the brown, acicular setae borne near the sides of the annulus.

Range: Costa Rica, Venezuela, and Ecuador, at middle elevations, 950–2,700 m.

Ecuadorian specimen examined: Eastern slopes of the cordillera, valley of Río Negro, near the junction of Río Negro and Río Pailas, Prov. Santiago-Zamora, *Prieto* (Camp E-4904) (NY, US).

In its peculiar aspect, with the blade segments much more strongly adnate above than below and with a conspicuous hump on the upper side at the base, thiss pecies is similar to *Grammitis* ***phlegmaria*** (J. Smith) Morton, comb. nov. [*Polypodium phlegmaria* J. Smith, London Journ. Bot. 1:194. 1842], which species differs strongly, however, in the presence of rhizome scales, and in the nonsetiferous margins of the segments and the glabrous sporangia.

19. Grammitis senilis (Fée) Morton, comb. nov.

Polypodium senile Fée, Mém. Foug. 7:60, pl. 25, fig. 1. 1857. Type: Ocaña, Dept. Santander, Colombia, *Schlim* 364. Cf. Maxon, Contr. U.S. Nat. Herb. 13:43. 1909.

Ctenopteris senilis Copel. Phil. Journ. Sci. 84:398. 1955.

Range: Guatemala to Ecuador; also Cuba, and Hispaniola(?).

Habitat: Pendent epiphyte, at 1,700 to 3,200 m. elevation, or occasionally at lower altitudes.

Ecuadorian specimen examined: Valley of Río Sangarinas, Cordillera de Llanganates, Prov. of Tunguragua, 3,000 m., *Asplund* 9764 (US).

20. Grammitis dependens (Baker) Morton, comb. nov.

Polypodium dependens Baker, *in* Hook & Bak. Syn. Fil. 335. 1868. Type: Mount Pichincha, Ecuador, *Spruce* 5637 [21] (photograph Maxon 146, US).

Range: Known definitely only from Prov. Pichincha, Ecuador. Probably also in Peru and Bolivia.

Habitat: Pendent epiphyte, probably from high elevations.

Ecuadorian specimens examined: Mount Pichincha, *Mille* 6 (US). Cerro Corazón, *Sodiro* 48/20 (fragment US).

Although reduced to a synonym of *C. heteromorpha* by Copeland, it appears to me to be distinct, and probably more closely allied to *G. sericeo-lanatum*. Apparently, it never has forked fronds like *G. heteromorpha*, and the segments are different in outline.

21. Grammitis subtilis (Kunze ex Klotzsch) Morton, comb. nov.

Polypodium subtile Kunze ex Klotzsch, Linnaea 20:375. 1847. Type: Mérida, Venezuela, *Moritz* 325 (isotype US).

Ctenopteris subtilis J. Smith, Hist. Fil. 184. 1875.

Range: Guatemala to Ecuador.

Habitat: Epiphyte in forest at elevations from 1,500 to 2,400 m.

Ecuadorian specimens examined: Alégria, east of Volcán de Cayambe, Prov. Imbabura, 2,900 m., *Drew* E–170 (US).

22. Grammitis subflabelliformis (Rosenst.) Morton, comb. nov.

Polypodium subflabelliforme Rosenst. Repert. Sp. Nov. Fedde 7:306. 1909. Type: Mount Abitagua, Ecuador, *Spruce* 5271 (isotype US).

Polypodium subflabelliforme var. *minor* Rosenst. op. cit. 307. Type: Mount Tunguragua, Ecuador, *Spruce* 5272 (not seen).

Ctenopteris subflabelliformis Copel. Phil. Journ. Sci. 84:400. 1955.

Range: Known in Ecuador only from the types; reported from Peru and Bolivia by Copeland.

Habitat: Epiphyte.

23. Grammitis lehmanniana (Hieron.) Morton, comb. nov.

Polypodium lehmannianum Hieron. Bot. Jahrb. Engler 34:513. 1904. Syntypes: Near Cuaiquer and San Pablo, Cordillera de Pasto, Dept. Nariño, Colombia, 1,000–1,300 m., *Lehmann* 19 (US); between Baños and Jivaria de Piutuc, Pastaza Valley [prob. Prov. Tunguragua],

[21] Originally published as 563, in error.

Ecuador, *Stuebel* 1011. Lectotype: *Lehmann* 19, inferentially selected by Maxon, Proc. Biol. Soc. Washington 57:18. 1944.

Polypodium pastoense C. Chr. Ind. Fil. 551. 1906. Illegitimate, an unnecessary renaming of *P. lehmannianum* Hieron., non *P. lehmannii* Mett.

Polypodium sublongipes Christ, Bull. Soc. Bot. Genève II, 1:218. 1909. Type: Costa Rica, *Wercklé* in 1904 (P). Synonymy sec. Maxon, loc. cit.

Range: Guatemala to northern Ecuador.

Habitat: Epiphyte at low elevations, 300–1,300 m.

Ecuadorian specimens examined: Puyo, Prov. Napo-Pastaza, 300 m., *Mexía* 6922 (US).

Although he saw and annotated the specimens, the North American range was overlooked by Copeland in his published account, as was also the synonym *P. sublongipes*.

24. Grammitis laxa (Presl) Morton, comb. nov.

Polypodium laxum Presl, Rel. Haenk. 1:23, pl. 4, fig. 1. 1825. Type: Mountains of Peru, *Haenke* (not seen).

Range: Peru and Bolivia; not as yet known in Ecuador, but of possible occurrence.

Habitat: Epiphyte at high elevations.

Although made a synonym of *C. lanigera* by Copeland, this seems distinguishable to me. I am taking as representative: La Convención, Dept. Cuzco, Peru, 4,500–4,750 m., *Bües* 2130 (US); between Huánuco and Pampayacu, Peru, *Kanehira* 122 (US); and Yungas, Bolivia, *Bang* 483 (US); the last named was identified as *laxum* by Hieronymus.

25. Grammitis lanigera (Desv.) Morton, comb. nov., var. **lanigera**

Polypodium lanigerum Desv. Ges. Naturf. Freund. Berlin Mag. 5:316. 1811. Type: Peru, *Dombey* (P, photograph Cintract, US).

Polypodium sericeo-lanatum Hook. Sp. Fil. 4:221. 1864. Syntypes: Pichincha, Ecuador, 12,000 ft., and woods near Baños, *Jameson* 235, 73, 29, 394; mountains of Guayrapata, Ecuador, *Spruce* 5277 K!; Ocaña, Dept. Santander, Colombia, 10,000–11,000 ft., *Schlim* 313 (indicated by Hooker as aberrant). Lectotype: Ravines of Pichincha, 11,000–12,000 ft., *Jameson* 235 (K, fragment US).

Polypodium alternifolium Hook. Sp. Fil. 4:222. 1864, non Willd. (1810). Syntypes: Near Esmeraldas and between Cuenca and Guayaquil, Ecuador, 3,000–10,000 ft., *Jameson* (K, photograph US), *Hartweg* 1496 (photograph US). Lectotype: the Jameson collection (K, fragment US).

Polypodium longum C. Chr. Ind. Fil. 541. 1906. New name for *P. alternifolium* Hook., non Willd.

Ctenopteris lanigera Copel. Phil. Journ. Sci. 84:420. 1955.

Ctenopteris sericeo-lanata Copel. op. cit. 453.

Ctenopteris longa Copel. loc. cit.

Grammitis sericeo-lanata Proctor, Rhodora 63:35. 1961.

Range: Costa Rica to Bolivia; Hispaniola, Martinique.

Habitat: Epiphyte (or perhaps occasionally rupicolous) in cool forests, in Ecuador at elevations from 2,500 to 3,300 m. The altitude "3,000 feet" given by Hooker in the original description of *P. alternifolium* was surely an error.

Ecuadorian specimens examined: Mount Pichincha,Prov. Pichincha, August 1901, *Sodiro* (US) (this collection bears a note by Weatherby: "Like the type of *P. lanigerum*"; it is also a topotype of *P. sericeo-lanatum*); ibid., *Mille* 10, 11, 382, s. n. (US). Mount Tunguragua, Prov. Tunguragua, *Rimbach* 126 (US); ibid., Rosenstock, Fil. Ecuad. 33 (US). Huagrarancha, Prov. Azuay, "llashipilla," *Steyermark* 53415 (US). Pan-American Highway 40 km. south of Cuenca, Prov. Azuay, *Wiggins* 10768 (US). Baños, Prov. Tunguragua (probably), *Jameson* 29 (K, syntype of *P. sericeo-lanatum*, photograph and fragment US).

Although Copeland recognized all three species *C. lanigera*, *C. sericeo-lanatum*, and *C. longa* as distinct, and even placed the first named in a different one of his "groups," I am unable to distinguish them. There is certainly a good deal of variation, but not more than to be expected.

25a. Grammitis lanigera (Desv.) Morton var. **stella** (Copel.) Morton, comb. nov.
Ctenopteris stella Copel. Phil. Journ. Sci. 84:452. 1955. Type: Valley of Río Urubamba, Dept. of Cuzco, Peru, *Bües* A32 (US).

Range: Colombia to Peru.

Habitat: Epiphyte, at elevations from 2,750 to 3,500 m.

Ecuadorian specimens examined: Pichincha, Prov. Pichincha, *Sodiro* (US). Paramba, August 1904, *Sodiro* (US). Las Torres, Cordillera de Llanganates, Prov. Tunguragua, *Asplund* 9814. North of Páramo del Castillo, Prov. Azuay, *Camp* E–5164. La Floresta, south of Sigsipamba, on Río Blanco, Prov. Imbabura, *Wiggins* 10298.

For some reason, not stated and not clear, Copeland placed his new species *C. stella* in a different group from either *C. lanigera* or *C. sericeo-lanata*, thus having essentially the same species in three different groups. In the group in which Copeland placed it [the "Group of Ctenopteris suspensa"], *C. stella* would indeed be distinct, but it is hardly different from typical *sericeo-lanata*, which normally has some of the hairs along the rhachis beneath stellate. The var. *stella* differs only in having these hairs darker (and thus more obvious) and perhaps often somewhat longer stalked.

26. Grammitis cultrata (Willd.) Proctor, Rhodora 63:35. 1961.
Polypodium cultratum Willd. Sp. Pl. 5:187. 1810. Type: Jamaica, *Swartz* (B, Herb. Willd. 19674, photograph US).

Polypodium elasticum Bory ex Willd. Sp. Pl. 5:183. 1810. Type: Bourbon [Réunion], *Bory*.

Polypodium cultratum var. *minus* Hook. Sp. Fil. 4:190. 1864. Based on *P. elasticum* Bory.

"*Polypodium cultratum P. elasticum*" Baker, *in* Hook. & Bak. Syn. Fil. 190. 1868. (Invalid form of varital publication in binomial form.)

Ctenopteris elastica Copel. Phil. Journ. Sci. 84:426. 1955.

Range: Mexico to Peru; Greater Antilles.

Habitat: Epiphytes, at elevations from 1,350 to 3,300 m.

Ecuadorian specimens examined: Río Palora, Prov. Napo-Pastaza, 1,400 m., *Rimbach* 68 (US). Cordillera Cutucú, Prov. Santiago-Zamora, 1,350–1,650 m., *Camp* E–1322 (US). North of Páramo del Castillo, Prov. Azuay, 3,000–3,300 m., *Camp* E–5167 (US).

Copeland said that if *P. cultratum* and *P. elasticum* are the same the "prior and valid" specific epithet is *elastica*, but this is not true. Both *elasticum* and *cultratum* were published at the same time in the same work; by "prior" in such instances Copeland meant "page priority," which has nothing to do with real priority. Copeland never followed the rule in the Code for the determination of the correct specific epithet in names of the same date [1961 ed., Art. 57], namely: "The author who first unites taxa bearing epithets of the same date has the right to choose one of them, and his choice must be followed." Hooker in 1864 in reducing *P. elasticum* to a variety of *P. cultratum* (as var. *minus*) effectively made a choice between the two epithets, and he must be followed, as he has been by Christensen and others. No other author before Copeland (1955) ever made the reverse choice of adopting *elasticum* and reducing *cultratum* to synonymy.

27. Grammitis subsessilis (Baker) Morton, comb. nov.

Polypodium pteropus Hook. Sp. Fil. 4:192, pl. 275B. 1864, non Blume, 1828. Syntypes: Andes of Quito, *Jameson* 348, *Spruce* 5712; Mount Abitagua, *Spruce*; Mount Roraima, *Schomburgk*; "New Granada." *Hartweg* 1495. Since I have not seen the original collections, I refrain from selecting a lectotype.

Polypodium subsessile Baker, *in* Hook. & Bak. Syn. Fil. 329. 1868. New name for *P. pteropus* Hook. non Blume.

Ctenopteris pteropus J. Smith, Hist. Fil. 185. 1875.

Polypodium euchlorum Kunze ex Hieron. Bot. Jahrb. Engler 34:509. 1904. Type: Must be considered an illegitimate renaming of *P. subsessile* Baker, cited in synonymy, although nominally based on *P. euchlorum* Kunze ex Klotzsch, Linnaea 20:375. 1847 (nom. nud. in syn.).

Ctenopteris subsessilis Copel. Phil. Journ. Sci. 84:411. 1955.

Range: Costa Rica to Bolivia.

Habitat: Epiphyte in dense forests at elevations from 1,100 to 2,700 m. (or at low elevations of 200 m. in the Chocó region of Colombia).

Ecuadorian specimens examined: Chiguinda, East Andes of Sigsig, Prov. Azuay, 1,800 m., *Lehmann* 6517 (US). Río Palora, Prov. Napo-

Pastaza, 1,500 m., *Rimbach* 74 (US). Bobonaza, Prov. Napo-Pastaza, 1,900 m., *Fuller* 116 (US). Río Negro, Prov. Santiago-Zamora, *Prieto* (Camp E–4903) (US). Cordillera Cutucú, Prov. Santiago-Zamora, 1,400–1,500 m., *Camp* E–1169 (US). Eastern Cordillera, 1–8 km. north of Sevilla de Oro, Prov. Azuay, 2,400–2,700 m., *Camp* E–4462 (NY).

28. Grammitis jamesonioides (Fée) Morton, comb. nov.

Polypodium jamesonioides Fée, Mém. Foug. 7:59, pl. 21, fig. 4. 1857. Type: Ocaña, Dept. Santander, Colombia, *Schlim* 399 (not seen).

?*Polypodium azuayense* Sodiro, Crypt. Vasc. Quit. 323. 1893. Type: Quinoas, Prov. Azuay, Ecuador, *Rimbach* 18 (not seen).

Range: Costa Rica to Ecuador; Hispaniola.

Habitat: Pendent epiphyte, at elevations from 2,600 to 3,600 m.

Ecuadorian specimens examined: Mount Tunguragua, *Sodiro* (US). Huagrarancha, south of El Pan, Río Collay, Prov. Azuay, *Steyermark* 53380 (US). Harta-Naqua, *Espinosa* 1021 (US).

The material from Hispaniola, Costa Rica, and Panama needs to be studied further, for it is not identical with that of South America.

29. Grammitis pseudocapillaris (Rosenst.) Morton, comb. nov.

Polypodium pseudocapillare Rosenst. Meded. Rijksherb. Leiden 19:17. 1913. Type: Above Tablas, *Herzog* 2190a (isotype US).

Ctenopteris pseudocapillaris Copel. Phil. Journ. Sci. 84:407. 1955.

Range: Colombia to Bolivia.

Habitat: Epiphyte, 3,000 to 3,400 m. elevation.

Ecuadorian specimens examined: Hoyada de Galápagos, between Huagrarancha and Loma de Galápagos, Prov. Azuay, *Steyermark* 53475 (US). Páramo area north of Páramo del Castillo, Prov. Azuay, *Camp* E–5140 (US).

30. Grammitis myriophylla (Mett.) Morton, comb. nov.

?*Polypodium longisetosum* Hook. Sp. Fil. 4:225. 1864. Type: Andes of Quito, Ecuador, *Jameson* 79 (not seen).

Polypodium myriophyllum Mett. ex Hook. & Bak. Syn. Fil. 338. 1868.[22] Type: Tatanara, Peru, *Lechler* 2567 (fragment US and Morton photo, 1931).

Ctenopteris myriophylla Copel. Phil. Journ. Sci. 84:412. 1955.

Range: Ecuador to Bolivia.

Habitat: Pendent epiphyte, at elevations from 2,800 to 3,400 m.

Ecuadorian specimens examined: Trail between Río Clavadero and ridge 10 miles south of Las Toldadas, east of Cayambe, Prov. Imbabura, 3,400 m., *Wiggins* 10498 (US).

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[22] Cited by Copeland as "Mettenius, Fil. Lechler. I (1845) 6," but it is a nom. provis. at this place, the collection being referred to the Javan species *P. tenuisectum* Blume, with the remark that it might prove distinct.

31. Grammitis major (Copel.) Morton, comb. nov.

Polypodium tenuiculum var. *acrosora* Hieron., Bot. Jahrb. Engler 34:511 1904. Type: In dense forest around Yerbabuena, western slopes of the West Andes of Cuenca, Prov. Azuay, Ecuador, 2,500–2,900 m., *Lehmann* 5727 (isotype US).

Ctenopteris major Copel. Phil. Journ. Sci. 84:455. 1955. Based on *P. tenuiculum* var. *acrosora* Hieron.

Range: Known only from the type.

Habitat: Epiphyte.

Although Copeland's new species *C. major* is based solely on *P. tenuiculum* var. *acrosora* Hieron., on another page of his work (1955, p. 440) he lists this variety also under *C. tenuicula*, and adds the inexplicable comment: "The Herb. Univ. Calif. are: *Brade* 6465 (isotype of var. *brasiliense* Ros.) and *Luetzelburg* 6726, both from Rio. Veins simple, . . ." This statement is inexplicable because this species [or variety] does not occur in Brazil.

32. Grammitis tunguraguae (Rosenst.) Morton, comb. nov.

Polypodium tunguraguae Rosenst. Repert. Sp. Nov. Fedde 7:307. 1909. Type: Mount Tunguragua, Prov. Tunguragua, Ecuador, August 1857, *Spruce* (fragment of holotype US).

Ctenopteris tunguraguae (Rosenst.) Copel. Phil. Journ. Sci. 84:394. 1955.

Range: Known only from the type.

Habitat: Mossy slopes, presumably terrestrial.

33. Grammitis anfractuosa (Kunze ex Klotzsch) Proctor, Rhodora 63:35. 1961.

Polypodium anfractuosum Kunze ex Klotzsch, Linnaea 20:375. 1847. Type: Mérida, Venezuela, *Moritz* 330 (isotype US).

Polypodium saxicola Baker, Journ. Bot. Brit. & For. 15:264. 1877, non Swartz (1817). Type: "No. 84, Herb. Kew. 1877" [coll. Jenman?]. (Not seen.)

Polypodium induens Maxon, Bull. Torrey Bot. Club 32:75. 1905. Based on *P. saxicola* Baker, non Swartz.

Range: West Indies; Guatemala to Peru.

Habitat: Normally epiphytic, but occasionally on humus-covered rocks or banks, in Ecuador from 1,225 to 2,195 m. elevation.

Ecuadorian specimens examined: At confluence of Río Mapoto and Río Pastaza, Prov. Tunguragua, *Penland & Summers* 207. Junction of Río Barbara and Río Arenillas, Prov. Santiago-Zamora, *Steyermark* 53612 (US).

34. Grammitis taxifolia (L.) Proctor, Rhodora 63:35. 1961.

Polypodium taxifolium L. Sp. Pl. 1086. 1753. Type: There is no specimen in the Linnaean Herbarium, and consequently the species must be considered to be based on the cited synonym *Polypodium tenue et pendulum* Plum. (Tract. Fil. Amer. 69, pl. 89. 1705), based on a plant from Morne de la Calabasse, Martinique, *Plumier*. Topotypes in the National Herbarium (Calabasse, *Duss* 1575, 1674, 4573) agree

with the description and figure of Plumier. [The distributor of the Duss duplicates united different numbers of the collection representing the same species, and so it is impossible to tell which of the three numbers the collection represents.]

Ctenopteris taxifolia Copel. Phil. Journ. Sci. 84:447. 1955.

Range: West Indies; continental range uncertain, although reported from Costa Rica to Brazil and Bolivia.

Habitat: In Ecuador, "on rotting logs, bases of trees, and soil," at 1,500 m. elevation. Normally epiphytic at middle elevations.

Ecuadorian specimens examined: Dense jungle, El Topo, south side of Río Pastaza, between Baños and Mera, Prov. Tunguragua, *Prescott & Wiggins* 21 (US).

Quite similar in aspect to *G. semihirsuta*, differing in the nonciliate rhizome scales and in the setulose lower surface of the segments.

35. Grammitis firma (J. Smith) Morton, comb. nov.

Polypodium firmum Klotzsch, Linnaea 20:378. 1847, non Kaulf. (1827).[23] Syntypes: "In alpibus Chile, *Philippi;* Guiana angl. *Rich. Schomburgk* 1170." Looser (Revista Universitaria [Chile] 36[1]:75. 1951) chose the Schomburgk collection as lectotype, as others have before him inferentially (e.g. Maxon, Proc. Biol. Soc. Washington 52:119. 1939), on the basis that the Chilean record is doubtful, perhaps erroneous, since the species has never again been found in Chile.

Ctenopteris firma J. Smith, Hist. Fil. 184. 1875. Considered a new name for *P. firmum* Klotzsch, non Kaulf.

Polypodium aromaticum Maxon, Proc. U.S. Nat. Mus. 27:743. 1904. Type: Blue Mountain Peak, Jamaica, 1,950–2,225 m., *Underwood* 1449 (fragment US).

Ctenopteris aromatica Copel. Phil. Journ. Sci. 84:418. 1955. (Illegit., because the earliest legitimate epithet *firma* was not adopted.)

Range: Jamaica: Guatemala to Bolivia (and Chile?).

Habitat: Epiphyte.

Not known as yet from Ecuador, but since it is found both north and south, it is likely to be found there.

36. Grammitis vernicosa (Copel.) Morton, comb. nov.

Ctenopteris vernicosa Copel. Phil. Journ. Sci. 84:452. 1955. Syntypes Alto de la Estrella, Costa Rica, *Standley* 39140 (US). "Canaan," Mount Puracé, Dept. El Cauca, 3,100–3,300 m., *Pennell & Killip* 6638 (US). Western Cordillera, Ecuador, 2,500 m., *Rimbach* 303 (US). Lectotype: *Standley* 39140 (although not so indicated in the published work, Copeland indicated the Standley specimen as type on the sheet).

Range: Costa Rica to Ecuador.

Habitat: Epiphyte, at elevations from 2,500 to 3,300 m.

Additional Ecuadorian specimens examined: Outskirts of Pifo, Prov. Pichincha, 2,500 m., *Mexía* 7353a.

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[23] *P. firmum* Kaulf. is wrongly said by Copeland to be a *nomen nudum*. It is a legitimately published renaming of *P. attenuatum* R. Brown, non Willd., which was previously renamed *P. brownii* Wikstr. (1825).

37. Grammitis pichinchensis (Hieron.) Morton, comb. nov.

Polypodium subscabrum sensu Hook. Sp. Fil. 4:183, pl. 274A. 1864, pro parte, non Klotzsch (1847).

Polypodium pichinchense Hieron. Bot. Jahrb. Engler 34:506. 1904. Syntypes: Ecuador, in declivibus occasum solis spectantibus ad truncos arborum, alt. s.m.c. 3,000–3,400 m., May 1862, *Jameson;* in regione urbis Quito, *Cuming* 32 p.p. Lectotype: *Jameson* (B, probable isosyntype US).

Polypodium ecuadorense C. Chr. Ind. Fil. 524. 1906. Illegitimate renaming of *P. pichinchense* Hieron., non *P. pichinchae* Sodiro. The epithets, although similar, must be considered different under the Code.

Ctenopteris ecuadorensis Copel. Phil. Journ. Sci. 84:434. 1955. (Illegit.)

Range: Known only from Ecuador.

Habitat: Epiphyte, at elevations from 2,800 to 3,500 m.

Ecuadorian specimens examined: Sin. loc., 3,000 m., *Sodiro.* Pichincha, Prov. Pichincha, March, 1903, *Sodiro.* Mount Tunguragua, Prov. Tunguragua, *Rimbach* 26, 129; ibid. Rosenst. Fil. Ecuad. 37. Sin. loc., 2,800 m., August 1918, *Mille* 4; ibid., 3,180 m., March 8, 1921, *Popenoe.* Volcán Atacatzo, 3,200 m., 1918, *Mille;* ibid., 3,400 m., 1919, *Mille.* "San Miguel," margin of páramo between Atuntiaqui and Hacienda Piñon, Prov. Imbabura, *Wiggins* 10325. Tipicocha, border of Prov. Chimborazo and Cañar, *Camp* E–4075. Páramo north of Páramo del Castillo, Prov. Azuay, *Camp* E–5183.

Polypodium ecuadorense is recognized on page 434 of Copeland's treatment as a valid species (and transferred to *Ctenopteris*) and on page 455 it is reduced to the synonymy of *C. pichinchae*, another instance of the extreme carelessness of Copeland's work. Since it is actually not very close to *C. pichinchae*, he very likely intended to recognize it as distinct but was misled by the similarity of the names *P. pichinchae* and *P. pichinchense.*

38. Grammitis cuencana (Hieron.) Morton, comb. nov.

Polypodium cuencanum Hieron. Bot. Jahrb. Engler 34:505. 1904. Type: Near Chagal and Yerbabuena, Western Cordillera of Cuenca, Prov. of Azuay, Ecuador, *Lehmann* 5728 (isotype US).

Ctenopteris cuencana Copel. Phil. Journ. Sci. 84:396. 1955.

Range: Known only from the type.

Habitat: Epiphytic in dense forest, at 2,400 to 2,800 m. elevation.

39. Grammitis pichinchae (Sodiro) Morton, comb. nov.

Polypodium pichinchae Sodiro, Crypt. Vasc. Quit. 329. 1893. Type: Mount Pichincha, Prov. Pichincha, Ecuador, *Sodiro* (not seen).

Ctenopteris pichinchae Copel. Phil. Journ. Sci. 84:455. 1955.

Range: Known only from northern and eastern Ecuador.

Habitat: Epiphyte, at elevations of 3,000 to 3,200 m.

Ecuadorian specimens examined: Papallacta, Prov. Pichincha, December 1923, *Mille*. Mount Tunguragua, Prov. Tunguragua, August 1903, *Sodiro*; ibid., *Rimbach* 127a, 131, 131a. Between Río Clavadero and ridge 10 miles south of Las Toldadas, east of Cayambe, Prov. Imbabura, *Wiggins* 10495. Junction of Río Itzintza and Río Chupiasa, Cordillera Cutucú, Prov. Santiago-Zamora, 3,500 ft., *Camp* E–1394 (NY).

40. Grammitis attenuatissima (Copel.) Morton, comb. nov.

Ctenopteris attenuatissima Copel. Phil. Journ. Sci. 84:456. 1955. Type: Mount Tunguragua, Prov. Tunguragua, Ecuador, December 1904, *Sodiro* (orig. distr. as *P. taxifolium* L.) (US).

Range: Known only from Ecuador.

Habitat: Epiphyte, at elevations from 3,200 to 3,300 m.

Additional Ecuadorian specimens examined: Western Cordillera of Riobamba, Prov. Chimborazo, *Rimbach* 22. Río Luguibi [?], *Rimbach* 113a.

41. Grammitis leucosticta (J. Smith) Morton, comb. nov.

Polypodium leucosticta Fée, Gen. Fil. 240. 1852, non *P. leucosticton* Kunze ex Klotzsch (1847). Type: Quito, Ecuador, *Jameson* (possible isotype US, *Jameson*, sin. loc.)

Ctenopteris leucosticta J. Smith, Hist. Fil. 184. 1875. To be considered a new name for *P. leucosticta* Fée, non Kunze, rather than a transfer.

Polypodium longiusculum C. Chr. Ind. Fil. 541. 1906. New name for *P. leucosticta* Fée.

Ctenopteris longiuscula Copel. Phil. Journ. Sci. 84:456. 1955. (Illegit., being superfluous, the name *C. leucosticta* J. Smith being available.)

Range: Ecuador and Peru.

Habitat: On banks at middle and high elevations.

Ecuadorian specimens examined: [Volcán] Pichincha, Prov. Pichincha, 1864, *Jameson* (US); ibid., *Sodiro* 26/54; ibid., April 1921, *Mille* 12; ibid., September, 1890, *Sodiro*. [Cerro] Igualata, Prov. Tunguragua, 2,800 m., July 1915, *Mille*. Along the Rio Matadero, west of Cuenca, Prov. Azuay, 10,000–10,500 ft., Mar. 3, 1945, *Camp* E–2001 (NY).

42. Grammitis alsopteris Morton, sp. nov. PLATE 4

Planta epiphytica; rhizoma ascendens, breve, crassum, apice paleaceum, paleis brunneis vix rigidis, anguste lanceolatis 3–5 mm. longis, medio ca. 0.5 mm. latis, acuminatis, apice piliformibus, ca. 13 cellulis latis, cellulis modice elongatis subrectangularibus 80–160 μ longis, ca. 38 μ latis, parietibus modo crassis brunneis, margine evidenter ciliatis, ciliis usque ad 0.25 mm. longis patentibus vel superioribus plus minusve adscendentibus, gradatim acuminatissimis, pallide brunneis, unicellularibus; frondes ca. 5, subcaespitosae, usque ad ca. 50 cm. longae et 7 cm. latae; stipites 8–13 cm. longi, crassi, ca. 1.8 mm. diam., fusci, teretes, non alati vel costati, ubique

dense setosi, setis patentibus rigidis brevioribus ca. 0.25 mm. longis, longioribus paucis ca. 1 mm. longis; laminae lanceolatae pinnatisectae basi vix angustiores vel interdum pinnis 2 vel 3 reductis, apice breviter acuminatae, rhachi crassa basi ca. 1.5 mm. diam., fusca, dense breviter setosa supra et infra, cum setis elongatis tenuibus ca. 2 mm. longis intermixtis; segmenta numerosa plus quam 50-jugata, alterna vel subopposita anguste elongata, 2–4.5 cm. longa, 3–3.5 mm. lata, margine leviter revoluta, non ciliata, apice rotundata vel vix acuta, basi adnata, lateribus subparallelis integris, supra pallide viridia glabra, hydathodis calcareis submarginalibus conspicuis praedita, subtus in costa setosa, in superficiebus minute setulosa, setulis brunneis patentibus rigidis vix 100–150 μ longis; venae numerosae 20–30-jugatae, angulo acuto excurrentes, simplices; sori uniseriati submarginales rotundi in venulis terminales, non paraphysati; annulus ex 12 vel 13 cellulis compositus; sporae sphaerico-tetraedricae, ca. 36 μ diam., superficebus levissime tuberculatae.

Type in the U.S. National Herbarium, no. 1,691,374, collected on tree trunk at Hacienda La Mascota, Canton Mera, Province of Napo-Pastaza, Ecuador, Feb. 28, 1935, at 900 m. elevation, by Ynes Mexía (no. 7013) (originally distributed as *Polypodium semihirsutum*).

The following Ecuadorian specimens, all more or less poor or fragmentary, are probably referable here: Río Savonilla and Zamora, eastern Andes of Loja, 600–1,200 m. alt., Nov. 1876, *Lehmann* LXXXV; Eastern Cordillera, between Ona and Río Yacuambi, Prov. Azuay, 8,000–9,500 ft. alt., Sept. 10–19, 1945, *F. Prieto* P–217; Carmen, 7,500 ft. alt., Nov. 13, 1953–June 18, 1954, *Tate* 488.

This species was included by Copeland in his *Ctenopteris semihirsuta* (Klotzsch) Copel., but it seems sufficiently distinct by the characters noted in the key.

43. Grammitis semihirsuta (Klotzsch) Morton, comb. nov.

Polypodium semihirsutum Klotzsch, Linnaea 20:379. 1847. Type: Peru, *Ruiz & Pavon* (isotypes US).

Range: Mexico to Bolivia and Brazil; Jamaica, Hispaniola.

Habitat: Epiphyte, at elevations from 1,400 to 3,300 m. At the highest elevations, on the margins of páramos, said to be sometimes terrestrial.

Ecuadorian specimens examined: Mount Tunguragua, Prov. Tunguragua, December 1904, *Sodiro* (US); ibid., 3,000 m., *Popenoe* (US). Mount Pichincha, Prov. Pichincha, 2,500 m., *Mille* 13 (US). Lloa Valley, near Quito, *Mille* (US). Ayapamba [prob. Prov. El Oro], *Rose* 23460 (US). Río Palora, Prov. Napo-Pastaza, 1,400 m., *Rimbach* 69 (US). Margin of páramo between Atuntiaqui and Hacienda Piñon, Prov. Imbabura, 3,300 m., *Wiggins* 10331 (US).

44. Grammitis rigens (Maxon) Proctor, Brit. Fern Gaz. 9:219. 1965.
Polypodium rigens Maxon, Proc. U.S. Nat. Mus. 27:741. 1904. Type: John Crow Peak, Jamaica, 1,650–1,800 m., *Maxon* 1346 (US).
Ctenopteris rigens Copel. Phil. Journ. Sci. 84:422. 1955.

Range: Greater Antilles; Guatemala to Peru.

Habitat: Epiphyte on mossy trunks, at middle elevations, 1,500–3,000 m.

This species is not known definitely from Ecuador, but it is to be expected. It is very close indeed to *Grammitis* ***pilosissima*** (Mart. & Gal.) Morton, comb. nov. (*Polypodium pilosissimum* Mart. & Gal. Mem. Acad. Brux. 15:39, pl. 9, fig. 2. 1842) described from Mexico, which is, however, saxicolous or terrestrial rather than epiphytic, and which also has darker and more numerous setae on the surfaces and margins; however, its distinctness is by no means certain.

45. Grammitis pseudonutans (Christ & Rosenst.) Morton, comb. nov.
Polypodium pseudonutans Christ & Rosenst. Repert. Sp. Nov. Fedde 5:15. 1908. Type: On trees, slopes of Mount Tunguragua, Prov. Tunguragua, 3,000 m., *Rimbach* (isotype, US).
Ctenopteris pseudonutans Copel. Phil. Journ. Sci. 84:389. 1955.

Range: Ecuador (Prov. of Carchi, Imbabura, and Tunguragua), and Colombia (Páramo del Tábano, Dept. Nariño, 3,200 m., *Cuatrecasas* 11920 (US).

Habitat: Epiphyte in forest or at lower margins of páramos, 3,000 to 3,200 m. elevation.

Ecuadorian specimens examined: Epiphytic, near lower margin of páramo, eastern slopes of Cayambe Peak, alt. 10,900 ft., Prov. Imbabura, *Wiggins* 10,407 (US). Small forms probably referable here are: tree trunk in dense forest, Hacienda La Rinconada, on trail between Morán and Olivos, Canton Espejo, Prov. Carchi, alt. 3,200 m., *Mexía* 7453 (US); base of tree ferns southeastern slopes of Volcán de Chile, near Tufino, Prov. Carchi, alt. 11,200 ft., *Wiggins* 10,619 (US).

Copeland did not clearly understand *G. pseudonutans*, which can be distinguished from *G. sodiroi* and other similar species by its thicker rhizome (2–2.5 mm. in diameter), rhizome scales without elongate, hairlike tips, stipe 2-ridged at summit above, lower pinnae much broader than long, setae not confined to sori, and so forth. *Cuatrecasas* 11920 and *Wiggins* 10407 were identified by Copeland as *sodiroi*, *Wiggins* 10619 as *rigescens*, and *Mexía* 7453 as *megaloura*, a quite different plant known otherwise only from the type from Guatemala.

46. Grammitis sodiroi (Christ & Rosenst.) Morton, comb. nov.
Polypodium sodiroi Christ & Rosenst. Repert. Sp. Nov. Fedde 5:14. 1908. Type: On tree trunks, Mount Tunguragua, Prov. Tunguragua, Ecuador, 3,500 m., *Rimbach* 24 (isotype US).

Range: Confined to Ecuador and known definitely only from Volcán Tunguragua, but two other somewhat aberrant specimens may be referable here: near Tipococha, Prov. Chimborazo-Cañar border, *Camp* E–4076; Hacienda Piñon, Prov. Imbabura, *Wiggins* 10359.

Habitat: Epiphyte in forest, 2,900 to 3,600 m. elevation.

47. Grammitis wolfii (Hieron.) Morton, comb. nov.

Polypodium wolfii Hieron. Hedwigia 48:249. 1909. Type: Near Mindo, at base of Mount Pichincha, Prov. Pichincha, *Stuebel* 745 (not seen).

Range: Known only from the type.

This species was overlooked by Copeland. From the description, it appears to be a valid species of the group of *G. moniliformis*.

48. Grammitis flabelliformis (Poir.) Morton, Contr. U.S. Nat. Herb. 38:57. 1967

Polypodium flabelliforme Poir., in Lam. Encycl. Meth. 5:519. 1804

Polypodium rigescens Bory ex Willd. Sp. Pl. 5:183. 1810. Type: Bourbon [Réunion], *Bory*.

Ctenopteris rigescens J. Smith, Hist. Fil. 184. 1875.

Range: Réunion; high mountains of Kenya, Tanganyika, Uganda, Nyasaland, and Congo; Hispaniola (one known collection); Venezuela along the Andes to Peru (and Bolivia?); Brazil.

Habitat: Perhaps variable. All the African material is epiphytic, including the type; all the American appears to be terrestrial or saxicolous, growing in páramos at elevations from 2,500 to 4,200 m.

Ecuadorian specimens examined: Pichincha: Mount Pichincha, 2,500 m., *Mille*. Volcán Atacatzo, 3,800 m., *Mille;* ibid., 4,200 m., *Firmin* 539.

Some of the American collections, including the Ecuadorian ones, appear to be slightly different from the African in having a more slender rhizome, less than 1 mm. in diameter, but this does not seem to hold in all regions. The species is exceedingly close to *G. moniliformis*, differing chiefly in having the segments more elongate, about twice as long as wide.

49. Grammitis peruviana (Desv.) Morton, comb. nov.

Polypodium peruvianum Desv. Mém. Soc. Linn. Paris 6:231. 1827. Type from Peru.

Ctenopteris peruviana J. Smith, Hist. Fil. 184. 1875.

Range: Ecuador to Bolivia; reported from Brazil and Argentina by Copeland.

Habitat: On rocks in páramos, 3,400 to 4,200 meters elevation.

Ecuadorian specimens examined: On rocks around Huasi-huaico, in Andes west of Cuenca, Prov. Azuay, 3,000–3,200 m., *Lehmann* 5006 (US).

50. Grammitis moniliformis (Lagasca ex Swartz) Proctor, Brit. Fern Gaz. 9:219. 1965.

Polypodium moniliforme Lagasca ex Swartz, Syn. Fil. 33. 1806. Type from Peru [*Ruiz & Pavon* ?].

Polypodium subcrenatum Hook. Icon. Pl. 8: pl. 719. 1848 [1845 teste Ind Fil.]. Andes of Quito, Ecuador, *Jameson* 215.
Ctenopteris moniliformis J. Smith, Hist. Fil. 184. 1875.

Range: Mexico to Bolivia; Greater Antilles.
Habitat: On mossy banks, at elevations from 2,300 to 3,900 m.

Ecuadorian specimens examined: Cerro Villanaco, Prov. Loja, *Wiggins* 10967. Between Loja and Portovelo, Prov. Loja [?], *Rose* 23314. Headwaters of Río Mangán, northeast of Azogues, Prov. Cañar, *Fosberg & Prieto* 22812. Páramo in vicinity of Cañar, Prov. Cañar, *Rose* 22757. Between Ona and Cuenca, Prov. Azuay, *Hitchcock* 21627. Páramo Tinajillas, 44 km. south of Cuenca, Prov. Azuay, *Wiggins* 10783 (NY, US). Above Sayaus, east of Cuenca, *Correll* E360. Along Río Matadero, west of Cuenca, Prov. Azuay, *Camp* E–1999. Páramos, vicinity of Toreador, between Molleturo and Quinoas, Prov. Azuay, *Steyermark* 53013. Nabón, Prov. Azuay, *Rose* 22999. Along Río Saloya, between Volcán Atacasp and Volcán Pichincha, Prov. Pichincha, *Steyermark* 52492. Páramo, 25 km. southwest of Quito, Prov. Pichincha, *Wiggins* 10253. Mount Pichincha, Prov. Pichincha, 1921, *Mille*. Río Silente, Volcán Corazón, Prov. Pichincha, *Lehmann* 408. Sin. loc., March 1921, *Mille* 5.

This is the commonest species of the group in Ecuador, judging from the number of collections, and it is also the most widely distributed. It is the one common truly terrestrial species, most of the others being either saxicolous or epiphytic.

51. Grammitis rosarum (Copel.) Morton, comb. nov.
Ctenopteris rosarum Copel. Phil. Journ, Sci. 84:387. 1955. Type: Vicinity of Huigra, Dept. of Chimborazo, Ecuador, *Rose* 22232 (US).

Range: Known from Ecuador from the type and one other collection (Carmen, Dept. of Bolivar, *Tate* 480) and from one collection from the Department of Antioquia, Colombia (*Daniel* 615).
Habitat: Not definitely known. Presumably terrestrial or saxicolous, at middle elevations.

52. Grammitis assurgens (Maxon) Morton, comb. nov.
Polypodium assurgens Maxon, Contr. Gray Herb. 165:73. 1947. Type: Quito-Santo Domingo road, Province of Pichincha, Ecuador, April 5, 1942, *Haught* 3226 (US).
Ctenopteris assurgens Copel. Phil. Journ. Sci. 84:386. 1955.

Range: Known from the type collection only in Ecuador, three collections from the Department of Cuzco, Peru, and two from Cerro Tatama, Department of Caldas, Colombia.
Habitat: Terrestrial on rocky or mossy banks or in grassy páramos, at elevations from 2,300 to 3,700 m.

Dubious Species

Polypodium curvans Mett. Ann. Sci. Nat. [Paris] V, 2:253. 1864.
Polypodium curvatum sensu Mett. Abh. Senck. Naturf. Ges. 2:58. 1857, non Swartz (1801).

Type: Peru, *Lechler*.

Placed in the synonymy of *C. curvata* by Copeland, but that can hardly be right. A specimen identified as *P. curvans* is Riobamba, Ecuador, 3,200 m., *Rimbach* 332; the material that I have seen is fragmentary. According to Dr. A. Murray Evans, *P. curvans* belongs in *Polypodium* and not *Grammitis*.

Polypodium melanopus Hook. & Grev. Bot. Misc. 3:384, pl. 111. 1833.
Ctenopteris melanopus Copel. Phil. Journ. Sci. 84:404. 1955.

Type: "Hanging vertically from the trunks of trees at Lurencucho [Surucucho], near Cuenca, at an elevation of about 9000 feet above the level of the sea, Prof. W. Jameson." (not seen).

From the description and figure, the species is dubious to me, as it was also to Copeland.

Polypodium oligosorum Mett. ex Kuhn, Linnaea 36:132. 1869, non Klotzsch, 1847.

Syntypes: Venezuela, *Moritz* 460, *Fendler* 208, *Karsten* 10.

A specimen that has been referred here is Ecuador, *Jameson* 790, p.p.; it is too fragmentary for identification, cf. p. 103.

Polypodium pilosissimum Mart. & Gal. var. **tunguraguense** Hieron. Hedw, 48:252. 1909 (as "*tunguraguensis*").

"Differt a forma typica foliis majoribus, usque ad ½ m longis; petiolis in speciminibus c. usque ad 1½ dm longis; laminis 30–43 cm longis, usque ad 3 cm latis; pinnis et segmentis usque ad 1½ cm longis, 5–6 mm basi latis, quam in forma typica latioribus; soris majoribus, usque ad 1½ mm diametientibus.—Rhizoma deest.

"An melius species propria (*P. tunguraguense* Hieron.)?

"Aequatoria: habitat ad radices montis Tunguragua prope Baños in valle Pastaza (n. 844a)."

A fragment of the holotype (*Stuebel* 844a) and a drawing by Brause were received by Dr. Maxon from Berlin, but the material is not adequate to place this plant, which does not seem to be exactly matched among the specimens in the U.S. National Herbarium. It is certainly not a variety of *P. pilosissimum* Mart. & Gal., and may well represent a new species, as indicated tentatively by Hieronymus.

?Gymnogramma sinuata Moore ex Baker, Ann. Bot. 5:483. 1891, non Presl, 1836.

Type: Andes of Quito, Ecuador, *Jameson* (holotype, K).

Dr. Jarrett has kindly examined the type and reports that the

frond is membranous and coarsely lobed; the sori are superficial, linear and up to 6 mm. long, and lie on the main vein-branches; the veins are free, with lax, pinnately arranged branches; at the point where the main vein to each lobe is given off from the midrib there is a vein directed toward the sinus. The name *G. sinuata* Moore is illegitimate, being a later homonym, and so cannot affect the name of any of the species accepted in this treatment.

The following names, overlooked by Copeland in his treatment of *Ctenopteris*, apparently are referable to *Grammitis*, but they cannot be placed definitely without an examination of the types, which are not available for consultation. Father Bosco's types were originally at the Istituto Salesiano S. Michele, Foglizzo, Italy, but their present location is uncertain. Dr. R. E. G. Pichi-Sermollii is attempting to locate them. Inasmuch as the original descriptions are not everywhere readily available they are reproduced below. The names were all based on collections of Father Crespi from Ecuador. The plants of this collection were so wildly identified that one cannot be sure that they are even in the right genus. For instance, the plant described as *Polypodium induens* var. *subdentatum* Bosco, which should be a *Grammitis*, is actually a synonym of *Dryopteris pusilla* (Mett.) Kuntze, as shown by an isotype in the U.S. National Herbarium. Father Bosco kindly sent to the National Herbarium a duplicate set of the Crespi collections, but unfortunately there were no duplicates available for a number of the reputed new species and varieties.

Polypodium allioni Bosco, Nu. Giorn. Bot. Ital., n. ser. 45:150. 1938.

"Species rhizomate legnoso, squamibus numerosis, lanceolatis, castaneis, caducis vestito; stipitibus remotis, subglabris, nigrescentibus, 4–6 cm. longis; frondibus coriaceis, oblongo-ovatis, in apicem acutum desinentibus, 25–40 cm. longis, 3–6 cm. latis, usque ad rachim crassam, nigram ac pilosam divisis in foliola ligulata, subacuta, integra, basi dilatata in rachim decurrentia; inferiora diminuta, paulatim orbicularia, superiora vero in apicem linearem, acutum, integrum desinentia; venis mediis nigricantibus patentibus, parvulis, venis secundariis immersis, haud visibilibus; soris 6–9 ex utraque inferiorum venarum parte singularum foliarum positis, crassis, fere contiguis.

"Hab.—Epiphyta in Paramos de Potrerillos (3200 m.) et ad Plan de Sapote (2100 m.).

"Nota.—S'avvicina al *P. mollissimum* Fée, da cui però differisce specialmente per le fronde coriacee e molto più sviluppate; e al *P. alternifolium* Hk. da cui differisce per le foglioline fra loro riunite per la base decorrente sulla rachide, stipiti e rachidi più robusti, sori piuttosto più vicini al nervo medio che al margine.

"Dedico questa specie al Missionario Salesiano, Padre M. Allioni, botanico e insigne esploratore dell'Equatore Orientale."

Polypodium crespianum Bosco, Nu. Giorn. Bot. Ital., n. ser. 45:150. 1938.

"Specie stipitibus ut rachibus nigricantibus, permultis pilibus setiformibus obtectis; frondibus 40–60 cm. longis, 5–8 cm. latis, oblongo-lanceolatis, basim versus et ad apicem gradatim diminutis; membranaceo-coriaceis, flaccidis, pendulis, in superiori pagina foliarum pilis tenuibus, subrubris et sericeis obtectis, in inferiori vero pilis albescentibus, lanosis, copiose obtectis; usque ad rachim in foliola ligulata, subacuta divisis, inter se basi dilatata et in rachim decurrente reunitis, gradatim ad apicem distantibus, in quo paulatim foliola acuta vel irregulariter circinnata fiunt et pilosissima; venis immersis, vena media parum visibili, caeteris invisibilibus; soris 10–12 in utraque parte inferioris omnium foliarum paginae dispositis, vena media et margine aequaliter distantibus, in densis pilis nidulantibus.

"Hab.—Epiphyta in silvis regionis nomine Plan de Sapote (2100 m.).

"Nota.—È una specie le cui dimensioni e l'aspetto generale fanno pensare al *P. sericeo-lanatum* Hk. da cui però differisce sia per la maggior quantità di peli sulla pagina inferiore delle foglioline, sia per l'aspetto dei sori, le venuzze affatto invisibili, causa i molti peli che ricoprono le foglioline e le rachidi più grosse."

Polypodium moniliforme Lag. ex Swartz var. **culebriliense** Bosco, Nu. Giorn. Bot. Ital., n. ser. 45:149. 1938.

"Differt a typo stipitibus longius distantibus inter se et brevissimis; lamina 8–15 cm. longa, 3–5 cm. lata, in apicem acutum, serrulatum desinente; segmentis triangularibus, subacutis; soris unicis in omni segmento, crassis, totam fere foliarum paginam inferiorem tegentibus.

"Hab.—In humidis petris ad Paramos de Culebrilla (3500 m.)

"Nota.—È una specie questa diffusa dal Messico al Cile e di cui esistono già, oltre il tipo, altre due varietà: *Peruvianum* Desv. del Perù e del Venezuela e *Rigescens* Bory dell'Equatore, Cile, Brasile, Cuba, Isola Fernando Po. A queste aggiungo ora la varietà Culebriliense v. n. la quale differisce dalle altre specialmente per le dimensioni e la forma delle foglioline.

"La collezione che no tra mano ha esemplari, della forma tipica e delle altre varietà, esclusa la *Peruvianum* Desv. la quale continua ad essere ancora endemica del Perù e del Venezuela."

Polypodium subsessile Baker ex Hook. & Bak. var. **longipinnatum** Bosco, Nu. Giorn. Bot. Ital., n. ser. 45:151. 1938.

"Frondes glabrae; pinnae lineares, filiformes, mediae 3–5 cm. longae; sori inter se adpropinquantes immo confluentes et total inferiorem foliarum paginam obtegentes.

"Hab.—Epiphyta, prope viam quae a regione nomine Indanza (950 m.) ducit ad flumen Santiago (540 m.)."

Polypodium tonellii Bosco, Nu. Giorn. Bot. Ital., n. ser., 45:148. 1938.

"Rhizoma tenue, erectum; squamibus parvis et paleis fulvo-castaneis vestitum; stipites brevissimi (1–2 cm. longi), fasciculati, paleis numerosis, erectis, tenuibus ut in rachibus et in margine segmentorum quibus est quasi corona vestiti; fronda 10–12 cm. longa, sublinearis, acuminata, basin versus gradatim decrescens, 3–5 mm. lata, acuminata, pennato-partita; segmenta triangularia, acuta, inter se separata senibus concavis, a suis basibus productis; venae immersae, haud visibiles, sori subrotundi, crassi, ad costam mediam adpressi, fere totam segmentorum paginam inferiorem obtengentes.

"Hab.—In terris humidis ad Plan de Sapote (2100 m.) et Plan de Milagro (1500 m.).

"Nota.—Per le dimensioni parrebbe il *P. serrulatum* Mett. dal quale però si differenzia sia per la copiosità di peli, sia per i sori non affatto confluenti e uno su tutti i segmenti, e non raggruppati nella metà superiore delle foglie; oltre anche alla forma dei segmenti. Differisce pure bene dal *P. Truncicula* Klotzs. al cui gruppo appartiene.

"Dedico questa specie al Rev. Prof. A. Tonelli già Insegnante ordinario di Scienze Naturali al Liceo Pareggiato "Don Bosco" in Valsalice (Torino), il conservò con cura la presente collezione e ne incitò lo studio (1)."[24]

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[24] "(1) Defunto il 3-1-1938. Di Lui rimangono pubblicazioni di etnologia e glottologia di alcune tribù del Brasile e specialmente studi notevoli e pregiati sul valore scientifico e sull'autenticità della S. Sindone che si conserva nel Duomo di Torino."

PLANTS OF ECUADOR
5107 29 Aug 45
Epiphyte.
Near the lagunas.
PROV. AZUAY—"ORIENTE" BORDER. Páramo del Castillo and ad
roaching forested areas [east] of the eastern cordillera on the trail between
Sevilla de Oro and Méndez. 9,000–11,000 ft. elev.
Distributed by the New York Botanical Garden
UNITED STATES NATIONAL MUSEUM

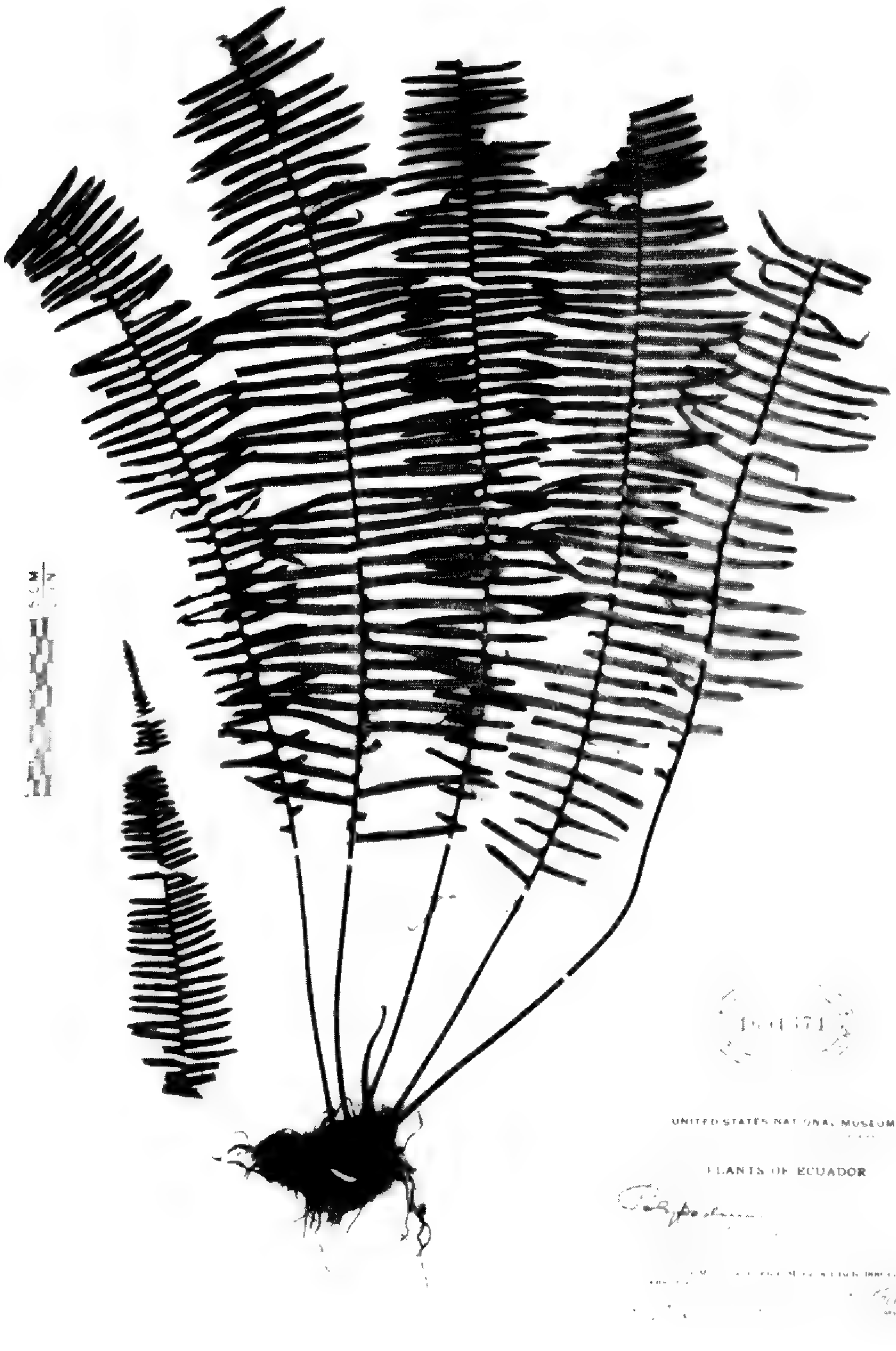
Holotype of *Grammitis apheloleپis* Morton

NEW YORK BOTANICAL GARDEN

Holotype of *Grammitis eminens* Morton

PLANTS OF ECUADOR
In rather deep shade of
old fronds persisting to form a heavy
neath current live fronds,
moisture; fronds soft-hairy;
Province of PICHINCHA
10 NOVEMBER 1944

Holotype of *Grammitis intricata* Morton



Holotype of *Grammitis alsopteris* Morton

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THE PERUVIAN SPECIES OF BESLERIA (GESNERIACEAE)

By C. V. MORTON

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THE PERUVIAN SPECIES OF BESLERIA (GESNERIACEAE)

C. V. Morton

Some years ago I published a revision of *Besleria*,[1] a rather common genus of woody Gesneriaceae of the American tropics extending from southern Mexico south to Bolivia and Brazil. Like most Gesneriaceae, these are plants of virgin forests and rarely are collected in secondary growth, and for this reason when forests are cut down the gesneriaceous flora is exterminated, often completely, because many of the species are extremely local in distribution. Many of the species are still known only from the original collections, and many will probably never be found again. In Peru the species are mostly confined to the wetter, eastern part, being especially numerous in the Departments of Amazonas, San Martín, Loreto, Huánuco, Junín, and Cuzco. Some few additional species are found in Cajamarca, Ayacucho, and Puno.

Since my revision was published some 28 years ago many additional collections have come in from Peru; especially noteworthy ones have been received from César Vargas, Ramón Ferreyra, H. A. Allard, J. J. Wurdack, and P. C. Hutchison. As is to be expected, these collections contain many new records for previously undescribed species and also several very interesting novelties, including one species of a section of the genus new to Peru.

I have grouped the species in the sections and subsections that I recognized in the revision, although I admit that these are undoubtedly somewhat artificial. The key to the Peruvian species that I have provided is wholly artificial but hopefully more usable than the original one.

The present paper does not account for all the Peruvian Beslerias, for several additional species are represented in the U.S. National Herbarium and doubtless others elsewhere. These specimens are inadequate in various ways, and so I do not wish to describe them at the present time without additional material. I am listing some of these below so that collectors can be on the lookout for them: Río Azul, 30 km. from Tingo María, Huánuco, 750–850 m., *Ferreyra* 12736; Porvenir, Pichis Trail, Junín, 1,500–1,900 m., *Killip & Smith* 25960;

[1] Contr. U.S. Nat. Herb. 26: 395–474. 1939.

Paso Gacsa, Exito to Puerto Durand, Huánuco, 2,800 m., *Vargas* 5357; Divisoria, 59 km. from Tingo María on highway to Pucallpa, San Martín, 1,600 m., *Allard* 21289; near Pajonal, Sandía, Puno, 1,000–1,300 m., *Metcalf* (3rd Univ. Calif. Bot. Gard. Exped. 30621); Pilcopata, Paucartambo, Cuzco, 580 m., *Vargas* 011605; Hacienda Schunke, La Merced, *Macbride* 5607; and Valley of Río Marañon above Cascadas de Mayasí, near Campamento St. Montenegro (km. 280–284 of Marañon road), Bagua, Amazonas, 450–600 m., *Wurdack* 1843. Some of these collections represent species widely different from any previously known, and so additional collections are much to be desired.

Key to the Peruvian Species of *Besleria*

Flowers solitary, fasciculate, or in subsessile umbels, a common peduncle lacking or much less than 1 cm. long. Disk glabrous (unknown in *B. horizontalis*).
Stems at apex, and costae and veins of the leaf blades beneath glabrous, strigose, strigillose, puberulous, or sericeous-tomentose, but not hirsute or spreading-villous.
Corolla tube glabrous externally. Ovary and style glabrous (style slightly pubescent in *B. aggregata*).
Calyx 3–5 mm. long, green. Corolla orange, 13–15 mm. long, lacking a hairy ring within.
Stems strigillose toward apex; leaf blades strigillose on the veins beneath, elliptic; calyx lobes 3–4 mm. long, nearly glabrous, ciliolate. Cajamarca . . . . . **1. B. solanoides**
Stems only microscopically strigillose; leaf blades microscopically strigillose, narrowly or broadly lanceolate; calyx lobes 5–6 mm. long, glabrous or sparsely hirsute externally, ciliate. Huánuco, 2,400 m. . . . . **2. B. gracilenta**
Calyx 9–16 mm. long, green or orange.
Calyx green, 9–15 mm. long, the lobes ovate-lanceolate, nearly glabrous; corolla tube yellow, the limb white. Stems sparsely strigose; petioles elongate, up to 11.5 cm. long; leaf blades elliptic or ovate-elliptic, up to 16 cm. long and 7.5 cm. broad, membranaceous, the veins 8 or 9 pairs; corolla 18 mm. long, lacking a hairy ring within. San Martín, 260 m. . . . . **15. B. membranacea**
Calyx orange, 13–16 mm. long in flower, the lobes ovate-lanceolate or lanceolate; corolla orange.
Stems and leaves completely glabrous; calyx lobes glabrous, ciliate; veins 8 or 9 pairs; corolla ca. 17 mm. long. Huánuco, 650 m. **16. B. angusta**
Stems and leaves beneath obviously strigillose; calyx lobes densely sericeous-pilose externally; veins 5–8 pairs; corolla 20–27 mm. long, the lobes ciliate, the tube with a hairy ring within (not known in *B. aggregata* var. *mexiae*).
Petioles up to 4 cm. long; leaf blades oblanceolate, up to 22 cm. long and 9 cm. broad, long-decurrent at base. Junín, Loreto, and Cuzco, up to 700 m. alt. **17. B. aggregata** var. **aggregata**
Petioles 7–10 cm. long; leaf blades elliptic, up to 22 cm. long and 11 cm. broad or more, cuneate at base but not long-decurrent. Loreto, 110 m. . . . . **17a. B. aggregata** var. **mexiae**

Corolla tube puberulous, strigillose, pilose, or villous externally.
Calyx 4–8 mm. long, yellow (green in *B. densiflora*), the lobes orbicular or ovate, strigillose or sparsely pilose externally.
Corolla more than 30 mm. long, subhorizontal in calyx, spurred at base posteriorly. Leaf blades obviously serrate above middle. Cuzco, 2,700 m. . . . . **31. B. horizontalis**
Corolla less than 20 mm. long, erect in calyx, not spurred at base.
Corolla orange, the tube merely puberulous externally, with a hairy ring within; stems strigillose-tomentose at apex; leaf blades oblanceolate, up to 10 cm. broad; calyx green, ca. 4 mm. long, the lobes orbicular, strigillose without; ovary glabrous; style pubescent. Loreto, 1,200 m. . . . . **3. B. densiflora**
Corolla lemon-yellow, the tube villous without, lacking a hairy ring within; stems sparsely strigose at apex; leaf blades oblong-lanceolate, up to 5 cm. broad; calyx lemon-yellow, 6–8 mm. long, the lobes ovate, acutish, sparsely pilose without; ovary and style pubescent. Loreto, 1,000–1,110 m. . . . . **18. B. citrina**
Calyx 13–16 mm. long, orange, the lobes ovate-lanceolate, acuminate, densely sericeous-pilose without. Stems densely appressed-pilose at apex; leaf blades strigillose on the veins beneath; corolla orange, 20–27 mm. long, the lobes ciliate, the tube with a hairy ring within (not known in *B. aggregata* var. *mexiae*), without only sparsely strigillose or pilosulous.
Petioles up to 4 cm. long; leaf blades oblanceolate, up to 22 cm. long and 9 cm. broad, long-decurrent at base. Junín, Loreto, and Cuzco, up to 700 m. alt. . . . . **17. B. aggregata** var. **aggregata**
Petioles 7–10 cm. long; leaf blades elliptic, up to 22 cm. long and 11 cm. broad or more, cuneate at base but not long-decurrent. Loreto, 110 m. . . . . **17a. B. aggregata** var. **mexiae**
Stems hirsute or spreading-villous at apex; costa and veins of the leaf blades hirsute or spreading-villous beneath.
Leaf blades glabrous above; corolla tube glabrous without (or sparingly pilosulous in *B. aggregata* var. *loretensis*). Ovary glabrous.
Calyx 15 mm. long; larger leaf blades up to 30 cm. long and 11 cm. broad, long-decurrent at base. Style pubescent. Loreto and San Martín, 100–625 m. . . . . **17b. B. aggregata** var. **loretensis**
Calyx 5–7 mm. long; leaf blades smaller. Corolla orange, ca. 12 mm. long.
Leaf blades up to 26 cm. long, 10–13 cm. broad, the petioles up to 4 cm. long; calyx 6.5–7 mm. long, the lobes rounded at apex, long-ciliate. San Martín, 100–200 m. . . . . **4. B. barbata**
Leaf blades up to 9 cm. long and 3.5 cm. broad, the petioles up to 2 cm. long; calyx ca. 5 mm. long, the lobes oblong, obtuse. Style pubescent. Cajamarca . . . . . **5. B. imberbis**
Leaf blades hirsute or pilose on the upper surface; corolla tube hirsute without (except in *B. furva*).
Corolla white, 13 mm. long, the tube glabrous without. Leaf blades obliquely ovate, up to 24 cm. long and 13 cm. broad, abruptly acuminate, unequally rounded at base; calyx 11 mm. long, the lobes ovate-lanceolate, acuminate, scarcely denticulate; ovary, style, and disk glabrous. San Martín . . . . . **19. B. furva**
Corolla yellow-orange, or red, 13–20 mm. long, the tube hirsute without, at least near apex.

Calyx ca. 6 mm. long, less than half as long as the corolla (14–16 mm. long). Calyx lobes free, elliptic, narrowed to base, equal, entire, obtuse or acutish, mucronulate, hirsute, long-ciliate; corolla lacking a hairy ring within, the lobes not ciliate; ovary pilosulous at apex; style pilosulous; disk glabrous. San Martín, Huánuco, 625–1,100 m. . . . . **6. B. placita**

Calyx 10–18 mm. long, at least two-thirds as long as the corolla (13–20 mm. long).

Calyx 13–18 mm. long, the lobes united to middle, the free parts triangular-subulate, entire; ovary, style, and disk glabrous. Corolla tube lacking a hairy ring within, the lobes not ciliate. Loreto, 400–900 m. . . . . **20. B. emendata**

Calyx 10–11 mm. long, the lobes free or nearly so; ovary pilose at least at apex; style pilosulous.

Calyx lobes narrow, not more than 3 mm. broad, entire; leaf blades serrate.

Corolla erect in calyx, not spurred at base, brick-red, the tube with a hairy ring within; leaf blades lanceolate or elliptic-lanceolate; filaments pilose at base. Loreto, 180–325 m. **21. B. immitis**

Corolla oblique or horizontal in calyx, slightly spurred at posterior base, yellow except for the 2 dark purplish posterior lobes of the limb, the tube lacking a hairy ring within; leaf blades elliptic-lanceolate; filaments glabrous. Ovary pilose; style pilosulous at base. Amazonas, 425–500 m. **32. B. wurdackii**

Calyx lobes ovate-lanceolate to lanceolate, 3–5 mm. broad near base, denticulate or serrate, hirsute without.

Calyx lobes thick, lanceolate, ca. 16 mm. long, almost equaling the corolla. Loreto, 1,500–1,600 m. . . . . **22. B. ferreyrae**

Calyx lobes thin, ovate-lanceolate, ca. 11 mm. long, much shorter than the corolla. Corolla pale lemon-yellow, 19 mm. long, lacking a hairy ring within; filaments glabrous. Loreto and San Martín, 220–1,500 m. . . . . **23. B. compta**

Flowers in peduncled inflorescences, the common peduncle (except sometimes in *B. sprucei*) 2 cm. long or more, the flowers umbellate, racemose, or subcorymbose.

Stems and costae and veins of the leaf blades beneath glabrate, strigose, strigillose, puberulous, or tomentose (in *B. corallina* and *B. rupestris*) but not hirsute or spreading villous, the leaf blades nearly glabrous above at maturity (except in *B. hutchisonii* and *B. rupestris*).

Calyx 2.5–7 mm. long. Ovary glabrous.

Corolla tube glabrous externally; style glabrous.

Common peduncle 2.5–5 cm. long. Leaf blades elliptic, nearly entire; calyx lobes suborbicular, ciliate.

Cololla orange-red, ca. 15 mm. long; calyx 4–5 mm. long; pedicels only 2 or 3 to an umbel, elongate, up to 2.5 cm. long; stems densely strigose toward apex; leaf blades up to 12.5 cm. long and 5 cm. broad, strigillose on the veins beneath. Huánuco, 2,300–2,700 m. . . . . **7. B. lucida**

Corolla whitish, 5–6 mm. long; calyx 2.5 mm. long; pedicels numerous, corymbose, short, ca. 5 mm. long; stems glabrate; leaf blades up to 28 cm. long and 12 cm. broad, minutely puberulous on the veins beneath. Loreto . . . . . **8. B. minutiflora**

Common peduncle 5.5–10 cm. long. Stems glabrous; petioles glabrous; leaf blades membranous; calyx lobes glabrous (ciliate in *B. variabilis*), entire, mucronate; corolla 20–26 mm. long, lacking a hairy ring within.

Corolla horizontal in calyx, spurred at posterior base, the tube strongly inflated upwardly, the orifice of the limb dorsal and not terminal. Petioles ca. 10 mm. long; leaf blades obliquely cuneate at base, obviously serrate, glabrous on the veins beneath, the primary veins 12–15 pairs; calyx 7–7.5 mm. long, the lobes not ciliate; corolla lobes glabrous, not ciliate. Loreto, 250–350 m.

35. B. caligula

Corolla erect in calyx, not spurred, the tube scarcely ventricose, the limb terminal. Petioles 4–11 cm. long; leaf blades obtuse at base, minutely denticulate, minutely strigillose on the veins beneath, the primary veins 8–10 pairs; calyx 3–4 mm. long, the lobes ciliate; corolla lobes sometimes ciliate. Junín, Ayacucho, San Martín, Loreto, Huánuco, 220–700 m.

Corolla greenish white; plants herbaceous.

9b. B. variabilis f. pallida

Corolla orange or brick-red.

Exterior corolla lobes not ciliate; plants fruticose.

9. B. variabilis f. variabilis

Exterior corolla lobes barbate; plants arborescent.

9a. B. variabilis f. barbatula

Corolla tube puberulous or pilosulous externally: style pubescent (except in *B. vargasii*).

Corolla tube with a hairy ring within at insertion of stamens; common peduncle 3–5 cm. long. Stems sparsely pubescent; petioles 1–4 cm. long; leaf blades elliptic-lanceolate, up to 20×8 cm., subentire, puberulous on veins beneath, subtomentose on margins; pedicels up to 5 mm. long; calyx lobes oblong-lanceolate, submucronate, subglabrous; corolla orange; Puno, 900 m. . . . **10. B. concolor**

Corolla tube glabrous within, stipitate-glandular within throat; common peduncle 5–16 cm. long.

Calyx lobes ovate, obtuse, not venose; corolla ochroleucous; leaf blades elliptic-lanceolate, 2–5 cm. broad. Filaments stipitate-glandular upwardly; anthers stipitate-glandular; Junín, 2,100 m.

11. B. pallidiflora

Calyx lobes suborbicular, rounded at apex; corolla yellow or red.

Stems nearly glabrous; calyx 4–7 mm. long, the lobes not venose; leaf blades up to 14 cm. long and 7 cm. broad, cuneate at base, puberulous beneath on veins. Filaments and anthers stipitate-glandular. Junín, Arequipa . . . . . **12. B. tetrangularis**

Stems densely coarse-strigose; calyx 3–4 mm. long, prominently venose; leaf blades 15–19 cm. long, 8–11 cm. broad, rounded at base, strigose beneath on veins. Style glabrous. Cuzco, 1,200 m.

13. B. vargasii

Calyx 6.5–15 mm. long. Flowers umbellate or subcorymbose.
Stems densely ferruginous-strigillose at apex when young. Petioles slender, up to 10 cm. long; leaf blades elliptic, ca. 15×10 cm., rounded at base, sparsely strigillose on the veins beneath; common peduncle ca. 10 cm. long; calyx ca. 15 mm. long, the lobes lanceolate, united to middle, acuminate; corolla tube glabrous without. Amazonas, Loreto, Cuzco, Puno, and Huánuco, 250–1,950 m. . . . . **24. B. divaricata**
Stems lanate-tomentose or tomentose at apex.
Corolla erect in calyx, not spurred at base; disk completely annular or semiannular, glabrous; leaf blades subentire or remotely and inconspicuously denticulate.
Inflorescences 8- to 15-flowered, on common peduncles 18–20 cm. long; leaf blades nearly glabrous on the upper surface at maturity; calyx lobes glabrous within or essentially so. Cuzco, 390 m.
25. B. moorei
Inflorescences 2- or 3-flowered, on common peduncles 1.5–1.8 cm. long; leaf blades obviously and persistently sericeous on the upper surfaces; calyx lobes puberulous within toward apex. Huánuco, 2,800 m. . . . . **26. B. hutchisonii**
Corolla horizontal in calyx, spurred at posterior base; disk reduced to a posterior gland or semiannular, pubescent; leaves crenate-serrate.
Calyx lobes broad, incised-serrate, pilose on both sides, ca. 7 mm. long; corolla scarlet, 15–17 mm. long, the tube densely pubescent without; ovary glabrous; style glabrous; disk semiannular; common peduncle 8–17 cm. long, the flowers subcorymbose, the pedicels numerous, up to 15 mm. long, pilosulous; leaf blades tomentulose on the veins beneath, glabrous above, the primary veins 9–11 pairs. Loreto, 100–1,200 m. . . . . **33. B. corallina**
Calyx lobes unequal, lanceolate to ovate-lanceolate, sharply serrate, sparsely pilose without, glabrous within, 6.5–8 mm. long; corolla yellow with maroon spots on tube and lobes within, 22–32 mm. long, sparsely pilose without; ovary villous; style pubescent; disk reduced to a thick posterior gland; common peduncle 6–7.5 cm. long, the flowers subumbellate, the pedicels fewer, ca. 6 mm. long, glabrous; leaf blades puberulous on the veins beneath, puberulous on upper surface, the primary veins 9–15 pairs. Junín, Huánuco, and Cuzco, 1,500–1,900 m. . **34. B. rupestris**
Stems at apex and costae and veins of the leaf blades beneath hirsute or tomentose-hirsute.
Calyx lobes united to about the middle, ca. 15 mm. long, lanceolate, acuminate, not mucronate. Leaf blades up to 15 cm. long and 6.5 cm. broad, nearly entire, cuneate at base, sparsely or densely hirsute above; common peduncle 4–6 cm. long; corolla orange-red, 20–22 mm. long, not much ventricose, the tube glabrous without, the throat sparingly stipitate-glandular within; ovary glabrous.
Corolla lobes pilose without. Junín and Huánuco, 700–2,500 m.
27. B. peruviana var. **peruviana**
Corolla lobes entirely glabrous. Junín, 700 m.
27a. B. peruviana var. **occulta**
Calyx lobes free or nearly so, not more than 11 mm. long, hirsute without, glabrous within; style pilosulous; ovary pilosulous at least at apex (except in *B. trichiata*).

Calyx 5–10 mm. long, the lobes linear-lanceolate, acuminate, entire, not mucronate. Leaf blades elliptic to oblanceolate, up to 25 cm. long and 10 cm. broad, membranous, serrate, cuneate at base; common peduncles up to 2.6 cm. long, the pedicels up to 1.5 cm. long; corolla 18–20 mm. long, the tube densely pilosulous without, conspicuoulsy ventricose, the throat glandular within.

Calyx lobes ca. 5 mm. long; corollas red; flowers numerous.

Cuzco, 700–800 m. . . . . **14. B. sprucei var. sprucei**

Calyx lobes ca. 10 mm. long; corollas yellow; flowers 2 or 3 on a peduncle.

Amazonas, 320 m. . . . . **14a. B. sprucei var. flavescens**

Calyx 10–11 mm. long, the lobes slightly or prominently mucronate. Corolla with a hairy ring within at insertion of stamens.

Calyx lobes oblong-lanceolate, with an elongate mucro arising below the apex; corolla yellow, ca. 13 mm. long, scarcely ventricose, the lobes scarcely pilose without, not ciliate, the tube glandular within throat; common peduncle up to 4 cm. long; filaments pubescent upwardly; anthers more or less pubescent; primary leaf veins ca. 10 pairs. Huánuco . . . . . **28. B. capitata**

Calyx lobes oblong, short-mucronate. Corolla 15–16 mm. long, the lobes hirtous or ciliate; pedicels thick.

Corolla brick-red, the tube densely hirto-pubescent without; common peduncle 9–15 cm. long, thick, the flowers racemose; primary leaf veins 13–15 pairs; leaf blades 17–26 cm. long, 8–15 cm. broad, rounded at apex, oblique and rounded at base. San Martín, Junín, 230–1,900 m. . . . . **29. B. racemosa**

Corolla yellow, the tube glabrous without; common peduncle up to 3.5 cm. long; filaments pilose at base; primary leaf veins 8–11 pairs; leaf blades up to 12 cm. long and 6.5 cm. broad, acute at apex, cuneate at base. Junín, Cuzco, 700–1,900 m. **30. B. trichiata**

Section *Besleria*

Leaf blades mostly subentire; common peduncle elongate or obsolete, the pedicels mostly numerous, rarely solitary; calyx lobes free or variously connate, mostly entire, sometimes mucronate; corolla erect in the calyx, not spurred at the posterior base, the tube mostly ventricose above the middle, the throat contracted, the limb terminal, small, subregular; disk mostly completely annular, glabrous.

TYPE: *Besleria lutea* L.

Subsection *Sessiles* Morton, Contr. U.S. Nat. Herb. 26: 405. 1939.

Common peduncle obsolete or not more than 4 mm. long; calyx lobes free or rarely united at base but not higher than middle, mostly obtuse or rounded, 3–7 mm. long, less than half as long as the corolla tube, entire, glabrous within.

TYPE: *Besleria solanoides* H. B. K.

267–632—68——2

1. Besleria solanoides H. B. K. Nov. Gen. & Sp. 2: 398. 1818.

This species, common in Colombia north to Honduras and Jamaica, is still known in Peru only from Tambillo, Department of Cajamarca, *Jelski* 24 (B); this Berlin specimen was doubtless destroyed, and so there may not be any specimens of this number existing.

2. Besleria gracilenta Morton, Contr. U.S. Nat. Herb. 26: 421. 1939.

The type came from Mirador, Huánuco, 2,400 m. alt., *Mexía* 04136 (GH). A more recent collection that may represent this species is: Tingo María side of Carpish, Dept. Huánuco, 2,550 m., October 1945, *Sandeman* 5245; it differs in having the calyx lobes sparsely hirsute without, rather than entirely glabrous; it is described by Sandeman as a subshrub with waxy, apricot-colored flowers growing in semishade beside a stream.

3. Besleria densiflora Fritsch, Notizbl. Bot. Gart. Berlin 11: 965. 1934.

Known only from Cerro de Ponasa, Loreto, *Ule* 6667 (holotype B, photograph US); since the holotype is presumably destroyed, the isotype at Geneva (Field photograph 28346) is here designated as lectotype.

4. Besleria barbata (Poepp. & Endl.) Hanst. Linnaea 34: 327. 1865.
Hypocyrta barbata Poepp. & Endl. Nov. Gen. & Sp. 3 : 3. 1845. Type: Pampayaco, San Martín, *Poeppig* (Isotype B, photograph US).

Poeppig 1508 (W, Field photograph 32788) from Cuchero, Huánuco, is presumably the same species.

5. Besleria imberbis Morton, Contr. U.S. Nat. Herb. 26: 430. 1939.

Still known only from the type: Tambillo, Dept. Cajamarca, *Raimondi* 5334 (B); the type is presumably destroyed at Berlin; there is a photograph of it in US.

6. Besleria placita Morton, sp. nov.

Caules dense hirsuti; folia opposita subaequalia, longe petiolata; laminae foliorum acuto-ellipticae, magnae, apice breviter acuminatae, basi cuneatae, remote denticulatae, utrinque hirsutae; pedicelli in axillis conferti, brevissimi; calyx parvus, lobis liberis, aequalibus, ovali-ellipticis obtusis vel acutiusculis, integris, vix mucronulatis, externe hirsutis, intus glabris, marginibus longe albo-ciliatis; corolla erecta, non calcarata, paullo ventricosa, tubo externe dense hirsuti-tomentoso, intus glabro, limbo terminali, parvo, lobis subaequalibus, erectis, eciliatis, intus glabris; filamenta glabra; ovarium apice paullo pilosulum; stylus vix pilosulus; discus brevis, annularis, glaber.

Shrub 1–1.7 m. high; stems rather thick, 3–5.5 mm. in diameter at 30 cm. below apex, unbranched upwardly, densely and persistently

white-hirsute; leaves opposite, subequal, the petioles 2–6 cm. long, hirsute; leaf blades pointed-elliptic, the larger 12×6 cm. up to 20×9 cm., sharply short-acuminate at apex, cuneate equally at base, remotely and minutely denticulate above the middle, herbaceous, sparsely but persistently hirsute above, paler green beneath, hirsute on the midrib, veins, and surface, the primary veins 7–9 pairs; flowers numerous in the leaf axils, crowded, the pedicels very short, less than 5 mm. long, hirsute; calyx ca. 6 mm. long, less than half as long as the corolla, the lobes free, equal, erect, oval-elliptic, 2.5–3 mm. wide at middle, slightly narrowed toward the base, obtuse or acutish but not acuminate, slightly mucronulate at apex, membranaceous, not venose, slightly hirsute externally, glabrous within, conspicuously long-white-ciliate; corolla orange, erect in calyx, not spurred at base but slightly gibbous above the base, 14–16 mm. long, 4–5 mm. wide at base, slightly ventricose, becoming 6.5–7 mm. wide at the middle, slightly contracted to the throat, this 5 mm. wide, externally densely hirsute-tomentose, glabrous within and lacking a hairy ring at the insertion of the stamens, the limb terminal, small, ca. 6 mm. wide, the lobes erect, subequal, ca. 1.5 mm. long, 1.5–2 mm. wide at base, glabrous and eglandular within, not ciliate; filaments glabrous, contorted; anthers connate, broader than long, 1–1.5 mm. long, 1.7–2 mm. wide, the cells confluent; ovary pilosulous at apex; style thick, ca. 6 mm. long, slightly pilosulous; disk completely annular, low, hardly 0.5 mm. high, glabrous.

Type in the U.S. National Herbarium, no. 1,999,822, collected in deep ravine in jungle on the slope east of Tingo María, Department of San Martín, Peru, at 625–1,100 m. elevation, Oct. 30, 1949–Feb. 19, 1950, by H. A. Allard (no. 20851).

PARATYPES (all in the U.S. National Herbarium):

SAN MARTÍN: *Allard* 21441,[2] 21593a,[3] 21601, 22243, 22422.
HUÁNUCO: Río Supte, Mar. 9, 1947, *Ferreyra* 1901.

This species belongs in the subsection *Sessiles;* it is closely related to *B. boliviana* Morton, which differs in having the calyx lobes acuminate, the corolla tube only slightly pilose, and the flowers solitary or few in the leaf axils instead of being crowded.

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[2] The corolla is indicated by Allard as "pinkish," but this is probably an erroneous observation; a truly pinkish color is not found among plants of this alliance.

[3] "On tree; flower pure white" on the label, but this is probably due to a faulty memory. Plants of this alliance are not usually epiphytes, and the other specimens of this species are clearly terrestrial. White flowers are characteristic of some few species of *Besleria,* but in this case the flower color does not appear to be different from that of the other specimens of this species. In most species of *Besleria* the corolla color is lost in drying.

Subsection *Pedunculatae* Morton, Contr. U.S. Nat. Herb. 26: 409. 1939.

Leaf blades entire or denticulate; common peduncle mostly elongate, the pedicels umbellate or subcorymbose; calyx lobes entire, mostly free, often obtuse or rounded, 2.5–7.5 mm. long, less than half as long as the corolla tube, glabrous within.

TYPE: *Besleria variabilis* Morton.

7. Besleria lucida Poepp. & Endl. Nov. Gen. & Sp. 3: 2. 1845.

The type came from Cochero [Cuchero], Huánuco, Peru, collected by Poeppig (not seen). Two additional specimens were cited in my revision, both from Huánuco, at elevations from 2,300 to 2,700 meters.

8. Besleria minutiflora Fritsch, Repert. Sp. Nov. Fedde 18: 9. 1922.

TYPE: Leticia, Loreto, Peru, *Ule* 6211 (B). The holotype was doubtless destroyed in Berlin. A photograph of it is in US; it is still known only from the type collection.

9. Besleria variabilis Morton, Contr. U.S. Nat. Herb. 26: 435. 1939.

Forma variabilis. The type came from Balsapuerto, Loreto, *Klug* 2912. Several variants, from San Martín, Ayacucho, and Junín were mentioned in the original description. One recent collection has been seen: Tingo María, Tulumayo, Huánuco, *Ferreyra* 1624. The species is known also from Colombia (Putumayo) and from between Palmar and Chapa, Bolivia, *Cárdenas* 5993. The taxonomic significance of the two formae described is uncertain.

9a. Besleria variabilis f. barbatula Morton, op. cit. 436. Type: Between San Nicolás and Azupizú, Junín, 650–900 m., *Killip & Smith* 22666 (US).

9b. Besleria variabilis f. pallida Morton, loc. cit. Type: Río Paucartambo Valley, Junín, 700 m., *Killip & Smith* 25293 (US).

10. Besleria concolor Fritsch, Notizbl. Bot. Gart. Berlin 11: 970. 1934.

Known only from the type: Chunchusmayo, Sandia, Puno, *Weberbauer* 1194 (B); the holotype was presumably destroyed at Berlin; there is a photograph of it in US.

11. Besleria pallidiflora Fritsch, Notizbl. Bot. Gart. Berlin 11: 968. 1934.

Still known from the type only: Yanangu, Junín, *Weberbauer* 2117 (B). The holotype is probably destroyed; there is a photograph of it in US.

12. Besleria tetrangularis Ruiz ex Hanst. Linnaea 34: 331. 1865.

Cited in my revision from Arequipa, Puno, and Junín, at elevations from 650 to 900 m. No additional collections have come in, but I have seen two additional photographs of isotypes (Vitoc, *Ruiz & Pavon*) from Madrid (Killip photograph 477, Field photograph 29614). The

sheet in Madrid represented by the last cited photograph is designated as lectotype, since the original holotype in Berlin has presumably been destroyed.

13. Besleria vargasii Morton, Journ. Washington Acad. Sci. 35: 126. 1945.

Still known only from the type collection: Mandor, Marcapata, Prov. Quispicanchis, Dept. Cuzco, 1200 m., *Vargas* 3732 (US).

14. Besleria sprucei Britt. Bull. Torrey Club 27: 31. 1900.

At the time of my revision, this species was known only from Bolivia (type: Mapiri, Bolivia, *Rusby* 2149, NY; isotype US) and Brazil (State of Amazonas, *Ule* 5927, type of *B. uleana* Fritsch). Several collections from Peru are now known: Near Atalaya on road to Pilcopata, Prov. Paucartambo, Cuzco, 750 m., *Vargas* 13969 (US); Consuelo to Asunción, Prov. Paucartambo, Cuzco, 850 m., *Vargas* 7356 (US); road to Fortaleza, Prov. Quispicanchis, Cuzco, 800 m., *Vargas* 9717 (US). According to notes by Vargas the plants are 1 to 1.5 m. high and the corollas red-orange. The following variety appears recognizable:

14a. Besleria sprucei Britt. var. **flavescens** Morton, var. nov.

Pedunculus communis brevis, 12–15 mm. longus, pauciflorus, floribus 2 vel 3; calycis lobi lineares, ca. 10 mm. longi; corolla flava (sec. Sagástegui).

Type in the U.S. National Herbarium, no. 2,469,215, collected at Montenegro, Provincia Bagua, Department of Amazonas, Peru, at 320 m. elevation, Oct. 15, 1965, by A. Sagástegui A. (no. 5867).

Subsection *Confertae* Morton, Contr. U.S. Nat. Herb. 26:411. 1939.

Common peduncle obsolete, the pedicels aggregate in the leaf axils; calyx lobes mostly nearly free, mostly acute or acuminate, 6–17 mm. long, more than half as long as the corolla tube.

TYPE: *Besleria immitis* Morton.

15. Besleria membrancea Morton, Contr. U.S. Nat. Herb. 26:445. 1939.

Known only from the Department of San Martín: Chazuta, Río Huallaga, 260 m., *Klug* 3994 (holotype US; isotypes F, GH); Río Mayo, near Tarapoto, *Spruce* s.n. (K); Trocha Agua Blanca-Desquite, on road to Tarapoto, Prov. Lamas, 600–800 m., *Ferreyra* 7975 (US).

16. Besleria angusta Morton, sp. nov.

Caules glaberrimi; folia opposita aequalia, breviter petiolata; laminae foliorum anguste lanceolatae 3.5-plo vel 4.5-plo longiores quam latiores, attenuatae, basi late cuneatae, subcoriaceae, integrae, fere concolores, utrinque glaberrimae; flores bini axillares in umbellis sessilibus, pedicellis brevibus crassis glabris; calycis lobi liberi imbricati

coriacei ovato-lanceolati, supra medium ligulati, obtusi, submucronati, utrinque glabri, margine ciliati; corolla in calyce erecta non calcarata, quam calyx vix longior, tubo non ventricoso externe glabro in fauce non contracto, limbo terminali subregulari intus piloso.

Shrub 2–4 m. high, the stems terete, unbranched above the base, ca. 5 mm. in diameter at 20 cm. below the tip, entirely glabrous; leaves of a pair subequal, short-petiolate, the petioles 2.5–4.5 cm. long, thick, glabrous; leaf blades narrowly lanceolate, 3.5–4.5 times as long as broad, the larger 24 cm. long and 6 cm. broad, long-acuminate at apex, broadly and subequally cuneate at base, entire, subcoriaceous, nearly concolorous, completely glabrous on both sides, the primary veins 8 or 9 pairs, obscure above, more or less immersed beneath or at least not elevated; flowers in 2-flowered sessile umbels in the leaf axils, the pedicels 10–15 mm. long, thick, ca. 1 mm. in diameter, glabrous, slightly enlarged at apex; calyx in flower ca. 13 mm. long (19 mm. long in fruit), the lobes coriaceous, free, imbricate, entire, ovate-lanceolate, ca. 7 mm. wide near base, narrowed and subligulate above the middle, costate above the middle, obtuse at apex and slightly mucronate, completely glabrous on both sides, conspicuously ciliate throughout; corolla orange, not much longer than the calyx, ca. 17 mm. long, erect in calyx, not spurred at base, fleshy in texture, the tube apparently not ventricose, ca. 4 mm. broad at middle, hardly contracted in throat, completely glabrous externally, the limb terminal, ca. 5.5 mm. wide, slightly pilose within the throat, the lobes subequal; ovary and style glabrous.

Type in the U.S. National Herbarium, no. 2,322,768, collected between Santa Isabel and Cucharas, Department of Huánuco, Peru, at 650 meters elevation, June 2, 1958, by Felix Woytkowski (no. 5023). Two isotypes in U.S. National Herbarium.

Belongs in section *Besleria*, subsection *Confertae*, but it is not nearly allied to the other species.

17. Besleria aggregata (Mart.) Hanst. *in* Mart. Fl. Bras. 8 (1): 400. 1864.

Hypocyrta aggregata Mart. Nov. Gen. & Sp. 3: 51. 1829. Type: Manacuru, on Rio Japura, Vaupés, Colombia, *Martius*. A specimen in München "in sylvis Japurensibus, R. N., *Martius*" (Morton photograph 8813) is doubtless an isotype.

Besleria ignea Fritsch, Notizbl. Bot. Gart. Berlin 11: 966. 1934. Type: Leticia, Loreto, *Ule* 6182 * * * (holotype B, photograph US; isotype G, Field photograph 28347). Inasmuch as the holotype is presumably destroyed, the isotype at Geneva is here designated lectotype.

In my revision of 1939, I adopted the name *B. ignea* and placed *B. aggregata* among the dubious species, remarking that the two might be identical. An examination of the isotype at München shows that the two are indeed the same, and so the earlier name *B. aggregata*

must be taken up. The typical variety occurs in Loreto and Junín, as reported previously, as well as in Amazonas, Brazil, and may now be reported also from Cuzco: Near San Lorenzo, Prov. Quispicanchis, 700 m., *Vargas* 11759 (US). The following varieties may eventually be found to represent distinct species.

17a. Besleria aggregata var. **mexiae** (Morton) Morton, comb. nov.
Besleria ignea var. *mexiae* Morton, Contr. U.S. Nat. Herb. 26: 444. 1939. Type: Rancho Indiana to Río Napo, Loreto, 110 m., *Mexía* 6447a (holotype US; isotype F).

17b. Besleria aggregata var. **loretensis** (Morton) Morton, comb. nov.
Besleria ignea var. *loretensis* Morton, Contr. U.S. Nat. Herb. 26: 444. 1939. Type: Between Yurimaguas and Balsapuerto, lower Río Huallaga Basin, Loreto, 135–150 m., *Killip & Smith* 28337 (holotype US).

In addition to the specimens, all from Loreto, previously reported, the following new collections are at hand: Guallabamba, near Iquitos, Loreto, 106–110 m., *Ferreyra* 3379, 3383. Ridge east of Tingo María, Department San Martín, 625–1100 m., *Allard* 21576, 22299.

17c. Besleria aggregata var. **semiannularis** (Morton) Morton, comb. nov.
Besleria ignea var. *semiannularis* Morton, Contr. U.S. Nat. Herb. 26: 444. 1939. Type: Florencio, Caquetá, Colombia, *Pérez Arbelaez* 751B (holotype US).

This variety is known also from Putumayo, Colombia (*Cuatrecasas* 10582) and is to be expected in Loreto, Peru. It differs in having the leaf blades softly pilose beneath and hirsute on the veins and the disk semiannular rather than completely annular.

18. Besleria citrina Fritsch, Notizbl. Bot. Gart. Berlin 11: 963. 1934.

Known only from the type: Moyobamba, Loreto, Peru, *Weberbauer* 4618 (B); the holotype was presumably destroyed at Berlin; there is a photograph in US.

19. Besleria furva Morton, Contr. U.S. Nat. Herb. 26: 447. 1939.

Still known only from the type collection: Tarapoto, Dept. San Martín, *Spruce* 4955 (K).

20. Besleria emendata Morton, sp. nov.

Caules ad apicem versus dense hirsuti; folia opposita inaequalia, longe petiolata, ovata, breviter acriter acuminata, membranacea, denticulata, supra et infra hirsuta; flores axillares solitarii, pedicellis gracilibus elongatis; calyx magnus tubum corollae fere aequans, membranaceus viridis, lobis ca. ad medium connatis, lobis liberis triangulari-subulatis externe hirsutis, intus glabris; corolla aurantiaca demum rubra, in calyce erecta, tubulosa, tubo apice piloso, intus glabro, limbo brevi subbilabiato, lobis externe pilosis, intus glabris

eciliatis; filamenta glabra; ovarium glabrum; stylus glaber; discus annularis glaber.

Subshrub up to 1.2 m. high; stems sparingly branched, slender, 2.5–4 mm. in diameter at 30 cm. below tip, densely hirsute apically with white, septate hairs; leaves opposite, the opposed slightly unequal, the larger with petioles 2–6 cm. long, the smaller on petioles 1–2 cm. long, all petioles obviously white-hirsute; larger leaf blades ovate, 9–14 cm. long, 4–8 cm. wide,[4] sharply short-acuminate, broadly cuneate at the unequal base, membranaceous, minutely and remotely glandular-denticulate, white-hirsute above on the surfaces, paler green beneath and white-hirsute on veins and surfaces, the primary veins 6–8 pairs; smaller leaf blades similar but only about two-thirds as long; flowers solitary in the leaf axils, the pedicels 1.2–2.5 cm. long, slender, white-hirsute; calyx green, membranaceous, venose, 13–18 mm. long, the lobes united to about the middle, the calyx tube 6–9 mm. long, the lobes entire, triangular-subulate, narrow and sharp at apex, 2.5–4 mm. wide at base, 6.5–9 mm. long, not mucronate, white-hirsute externally, glabrous within; corolla orange at first, becoming red later (fide Ferreyra), 17–20 mm. long, erect in calyx, not spurred at base but slightly gibbous above base, the tube 4–6 mm. wide at base, cylindric and hardly ventricose, 5–8 mm. wide above middle, slightly contracted in throat and 4–6 mm. wide, externally glabrous below, sparsely pilose at apex, glabrous within and without a hairy ring at the insertion of the stamens, the limb terminal, small, 6–10 mm. wide, slightly bilabiate, the lobes erect, suborbicular, the larger 3.5–4 (5) mm. long, the smaller 2–3.5 (4) mm. long, pilose externally, glabrous and eglandular within, not ciliate; filaments glabrous, contorted; anthers quadrately united, broader than long, ca. 1.5 mm. long, 2.5 mm. wide, the connective thickened, the cells confluent; staminodium ca. 3 mm. long, glabrous; ovary conic, glabrous; style thick, 9–10 mm. long, glabrous; stigma bilobed; disk completely and regularly annular, ca. 0.5 mm. high, glabrous; berry globose, enclosed in the persistent calyx.

Type in the U.S. National Herbarium, no. 2,025,103, collected at Boquerón, ca. 92 km. from Tingo María on the highway to Pucallpa, Department of Loreto,[5] Peru, at 410 meters elevation, Dec. 16, 1949–Jan. 5, 1950, by H. A. Allard (no. 21713).

PARATYPES (all in U.S. National Herbarium except as indicated):

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[4] Only 5×2.5 cm. in depauperate (sun?) plants, e.g., *Hutchison & Wright* 6043A.

[5] The label gives the department as San Martín, but Boquerón is actually in the Department of Loreto, in the Province of Coronel Portillo, not far from the border with San Martín.

LORETO: Boquerón [type locality], *Allard* 21716, 22131, *Swingle* 101, *Ferreyra,* 1189, 8104, *Hutchison & Wright* 6043A (UC), 6053 (US). Between Divisoria and Boquerón, *Ferreyra* 1101.[6]

RANGE: Known only from the vicinity of Boquerón, Department of Loreto, at elevations variously given as between 400 and 900 meters.

This species may be the same as *B. peruviana* var. *dissimilis* Morton,[7] but I regard it now as specifically different from *B. peruviana* Fritsch, which has the flowers borne in long-pedunculate umbels rather than solitary in the axils of the leaves. There are instances in *Besleria* where the common peduncle has been so reduced that the flowers appear to be borne in sessile umbels in the leaf axils, but in such cases at least a trace of the peduncle remains and the flowers are several. In *B. emendata* there is no trace of a peduncle and the flowers are solitary. I consider these characters as of more than varietal importance now, and in fact they are the basis for a part of my sectional division of the genus. I continue to place *B. peruviana* in subsection *Elongatae*, but *B. emendata* should be in subsection *Confertae*. However, it does not seem to be wise to base this species on *B. peruviana* var. *dissimilis* because it is not absolutely certain that the two are identical. This variety was based on *Tessmann* 3170 from the lower Ucayali River, Department of Loreto, Peru, but unfortunately the type was in Berlin and was lost during the war. There is a photograph of it in the National Herbarium but it is not sufficiently good to make an identification certain. Unless a duplicate of *Tessmann* 3170 can be located in some other herbarium, it is best to list *B. peruviana* var. *dissimilis* among the dubious plants of this genus. The only other species of section *Confertae* with calyx lobes connate to the middle is *B. tuberculata* Morton, of Colombia, which differs strongly in the tuberculate upper leaf surface, the villous ovary, the stipitate-glandular throat of the corolla, long-ciliate corolla lobes, and other characters.

21. Besleria immitis Morton, Contr. U.S. Nat. Herb. 26: 449. 1939.

The type came from Umbría, Putumayo, Colombia (*Klug* 1912, holotype US; isotype S). Known also from the Department of Loreto, Peru, at low elevations, as mentioned in the original description.

22. Besleria ferreyrae Morton, sp. nov.

Frutex, vix ramosus, caulibus crassis, dense lutescenti-villosis; folia longe petiolata, laminis ellipticis, acuminatis, basi late cuneatis, remote denticulatis, utrinque hirsutis; inflorescentiae fasciculatae,

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[6] At least one specimen of this number has been labeled incorrectly as "Between Sinchono and Boquerón, Dept. San Martín."

[7] Contr. U.S. Nat. Herb. 26: 452. 1939.

pedunculo communi nullo, pedicellis brevibus crassis hirsutis; calyx corollam fere aequalis, lobis lanceolatis acuminatis denticulatis, externe dense hirsutis, intus basi glabris apicem versus pilosis; corolla non calcarata, mediocris, supra medium valde ventricosa, externe dense tomentosa, intus glabra, limbo parvo terminali; filamenta glabra; ovarium pubescens; stylus basi pubescens; discus annularis integer glaber.

Shrub 0.8–1.2 m. high, hardly branched above the base, the stems very thick, ca. 6 mm. in diameter ca. 20 cm. below the apex, densely shaggy-yellowish-hirsute; leaves of a pair equal, long-petiolate, the petiole 4–4.5 cm. long, densely hirsute; leaf blades elliptic, 10×4.5 to 16×6 cm., sharply acuminate, broadly cuneate and subequal at base, remotely denticulate, obviously hirsute on both sides, the primary veins 8 or 9 pairs, upwardly curved; flowers fasciculate in the leaf axils, a common peduncle absent, the pedicels 2 or 3, short and stout, 5–10 mm. long, densely hirsute; calyx green, almost as long as the corolla, the lobes nearly free, lanceolate, ca. 16 mm. long, slightly unequal, one ca. 3 mm. broad at middle, the others ca. 2 mm. broad, acuminate, remotely denticulate, outside densely yellow-tomentose, within glabrous below middle, slightly pilose toward apex; corolla yellow, erect in calyx, not saccate at base, 4 mm. broad at base, ventricose above middle and ca. 6 mm. broad, slightly contracted in throat and 5 mm. broad, densely white-tomentose, glabrous within and lacking a hairy ring, the limb terminal, small, the lobes erect, ca. 2 mm. long and broad; filaments glabrous; anthers included, connate, 1 mm. long, 2 mm. broad; ovary pubescent; style pubescent; disk annular, low, entire, glabrous.

Type in the U.S. National Herbarium, no. 2,057,476, collected at Plantación Margarita, near Divisoria, Province of Coronel Portillo, Department of Loreto, Peru, in tropical woods at 1,500–1,600 meters elevation, Aug. 14, 1946, by Ramón Ferreyra (no. 989).

This species, named in honor of Sr. Ramón Ferreyra, of the University of San Marcos, in recognition of his invaluable services to Peruvian botany, belongs in the section *Besleria*, subsection *Confertae*. It may be allied to *B. compta* Morton, which differs in its slenderer, less strongly hirsute stems, less obviously hirsute leaves, more slender pedicels, and shorter, thinner, broader, and less densely hirsute calyx lobes, which are much shorter than the corolla.

23. Besleria compta Morton, Contr. U.S. Nat. Herb. 26: 449. 1939.

The type came from Balsapuerto, Loreto, 220 m., *Klug* 2926 (holotype US; isotypes B, GH, K, S); also known from the Department of San Martín, as noted in the original description, at elevations up to 1,500 meters.

Subsection Elongatae Morton, Contr. U.S. Nat. Herb. 26: 412. 1939.

Common peduncle elongate, the pedicels umbellate, racemose, or subcorymbose; calyx lobes free or connate to the middle, mostly entire, 10–17 mm. long, more than half as long as the corolla tube, mostly acuminate.

TYPE: *Besleria elongata* Urban.

24. Besleria divaricata Poepp. Nov. Gen. & Sp. 3: 2. 1845.

In my revision this species was reported in Peru from the Departments of Huánuco and Loreto and from some places in Ecuador. It appears now that this is one of the more common and widespread species in Peru, the following additional collections being at hand: Northern slopes of Cerros Campanquiz, Pongo de Manseriche, Loreto, 550–750 m., *Wurdack* 2376. Rain forest along Río Santiago, Dept. Amazonas, 230–300 m., *Wurdack* 2198. Trail from La Oroya to Santo Domingo, Prov. Sandía, Dept. Puno, 900–1,200 m., *Hodge* 6026. Three km. above Santo Domingo, Prov. Sandía, Dept. Puno, 1,950 m., *Metcalf* (U. Calif. Bot. Gard. Exped. 30649). Between San Pedro and Santa Isabel, Prov. Paucartambo, Dept. Cuzco, 1,400 m., *Vargas* 6769. Between Atalaya and Carbón, Prov. Paucartambo, Dept. Cuzco, 700 m., *Vargas* 13434. The plant is described by the collectors as a herb or bush 1 to 2.5 meters high, with waxy, orange-red corollas.

25. Besleria moorei Morton, sp. nov.

Herba alta, caulibus apice dense tomentosis; folia longe petiolata, laminis elliptico-oblongis, magnis, abrupte acuminatis, basi late cuneatis, remote denticulatis, supra fere glabris maturitate, subtus praecipue in venis tomentosis; inflorescentiae subcorymbosae, longe pedunculatae, multiflorae, pedicellis brevibus; calycis lobi liberi, subaequales, late ovati, mucronati, integri, externe hirsuti, intus fere glabri; corolla aurantiaca, in calyce erecta, ecalcarata, tubo medio ventricoso, in fauce contracto, externe hirsuto, limbo parvo subregulari, tubo intus basi annulum pilosum gerente; filamenta basi pilosa; ovarium glabrum; stylus pilosus; discus annularis, glaber.

Stout, branched herb up to 1 m. high, the upper stems ca. 5 mm. in diameter, densely brownish tomentose near apex; leaves of a pair apparently slightly unequal, the larger on petioles 9 cm. long and 2 mm. thick, these strigose or subtomentose when young; larger leaf blades elliptic-oblong, 27 cm. long and 11 cm. broad, the smaller 14 cm. long and 6 cm. broad, abruptly acuminate, the base broadly cuneate and subequal-sided, remotely denticulate, herbaceous, nearly glabrous above at maturity, pilosulous when young, subtomentulose beneath, especially on the veins, the primary veins ca. 15 pairs; inflorescences solitary, axillary, subcorymbose, 8- to 15-flowered, the common

peduncle very elongate, 18–20 cm. long, sparsely pilose, the pedicels thickish, 8–10 mm. long, glabrate; calyx lobes orange (fide Moore) free, subequal, imbricate, broadly ovate, 9.5 mm. long, 4–5 mm. broad, entire, hirsute externally, essentially glabrous within with only occasional scattered hairs, not veiny externally, venose within, mucronate; corolla orange, erect in calyx, not spurred at base, ca. 28 mm. long, the basal orifice ca. 3 mm. broad, the tube ca. 5.5 mm. broad just above base, rather abruptly ventricose at the middle and here 8–8.5 mm. broad, contracted in the throat, here ca. 6 mm. broad, externally pilose, more densely so near the throat, the limb terminal, 7–8 mm. broad, the lobes erect, semicircular, subequal, ca. 3 mm. long and broad, cucullate with recurved margins, pilosulous externally, glabrous within, not ciliate, within glabrous except for a pilose ring at the insertion of the fllaments; filaments inserted near base of corolla tube, connate with each other, flattened, slightly pilose near base, glabrous upwardly, coiled; anthers included, persistently connate, broader than long, ca. 1.5 mm. long, 2.5 mm. broad, the cells confluent; ovary ovoid, glabrous; style thick, pilose; disk completely annular, ca. 0.6 mm. high, unlobed, glabrous.

Type in the U.S. National Herbarium, no. 2,370,542, collected on roadside bank 16.6 km. from Quincemil, on the road to San Lorenzo, Province of Quispicanchis, Department of Cuzco, Peru, at ca. 390 m. elevation, June 11, 1960, by H. E. Moore, Jr., Adolfo Salazar C., and Earl E. Smith (no. 8583). Isotype presumably in Bailey Hortorium (not seen).

Besleria moorei belongs in section *Besleria*, subsection *Elongatae*, and in my key (1939) it will key out to *B. ovalifolia* Rusby (Mem. Torrey Bot. Club 4: 240. 1895), which is still known only from the original collection from Songo, Bolivia (*Bang* 862), but it cannot be very closely allied to that, which differs in having the calyx lobes essentially glabrous, long-acuminate, and united to above the middle. In its general characters and appearance it is much closer to *B. racemosa* Morton, of the Departments of San Martín and Junín, Peru, which differs in several ways, as follows:

Pubescence densely hirsute-villous; petioles 1–3 cm. long; common peduncles 9–15 cm. long; calyx lobes serrulate; corollas ca. 15 mm. long; ovary slightly pilosulous at apex . . . . . **B. racemosa**

Pubescence densely sericeous-tomentose; petioles 6–9 cm. long; common peduncles 18–20 cm. long; calyx lobes entire; corollas ca. 18 mm. long; ovary entirely glabrous . . . . . **B. moorei**

26. Besleria hutchisonii Morton, sp. nov.

Herba vel frutex parvus, vix ramosus, ramis crassis, sursum dense albido-tomentosis; folia breviter petiolata, petiolo crasso tomentoso, laminis mediocribus ellipticis, acuminatis, basi cuneatis, integris, supra

ubique dense sericeis, subtus praecipue in venis dense sericeis; inflorescentiae umbellatae, 2- vel 3-florae, pedunculo communi brevi, pedicellis antrorse hirsutulis; calyx magnus, lobis imbricatis liberis ovalibus rotundatis, non mucronatis, integris, extus dense sericeis, intus apice excepta glabris; corolla aurantiaca, parva, utrinque glabra, medio ventricosa, limbo terminali magno, lobis ciliolatis; filamenta glabra; antherae inclusae connatae latiores quam longiores; ovarium glabrum; stylus hirsutulus; discus annularis integer glaber.

Herb or small shrub up to 75 cm. high, the stems not branched above the middle, thick, ca. 5 mm. in diameter ca. 30 cm. below the tips, upwardly persistently densely whitish-tomentose; leaves of a pair equal, short-petiolate, the petioles 10–15 mm. long, thick, ca. 2 mm. in diameter, densely tomentose; leaf blades elliptic, 9–14 cm. long, 4–5.2 cm. broad, acuminate, cuneate at the base, entire, persistently and densely sericeous above, paler beneath and sericeous, especially on the veins, the primary veins 9–11 pairs, curved, ascending, strongly elevated beneath; inflorescences axillary, few, 2- or 3-flowered, the common peduncle short, 15–18 mm. long, sericeous, the hairs ascending, the pedicels ca. 10 mm. long, antrorsely hirsutulous; calyx 7–9 mm. long, more than half longer than the corolla, the lobes imbricate, free, oval, ca. 4 mm. broad, the sides curved, the apex rounded, not mucronate, entire, densely sericeous without, glabrous within except near the sparsely sericeous apex, 7–nerved, the nerves visible within, obscure without; corolla orange (fide Hutchison), erect in the calyx, ca. 15 mm. long, not spurred or gibbous at base, the tube ca. 4 mm. broad at base, upwardly a little ventricose and becoming ca. 6 mm. broad, the throat slightly contracted and 5.5 mm. broad, without glabrous, the limb terminal, ca. 8 mm. in diameter, the lobes erect, imbricate, broad, ca. 4 mm. long and 3.5 mm. broad, rounded, entire, glabrous without, slightly ciliate when young, the tube glabrous within; filaments inserted ca. 2 mm. above the base of the corolla tube, flattened, glabrous; anthers included, connate, broader than long, ca. 1.3 mm. long, ca. 2.2 mm. broad, glabrous, the locules confluent; ovary glabrous; style short, thick, hirsutulous; disk completely annular, slightly higher posteriorly, glabrous, entire.

Type in the U.S. National Herbarium, no. 2,466,984, collected at Carpish, above Acomoyo, Province of Huánuco, Department of Huánuco, Peru, at 2,800 meters altitude, July 17, 1964, by Paul C. Hutchison, J. Kenneth Wright, and R. M. Straw (no. 5937). Isotypes in F, UC, USM (not seen).

This species belongs in section *Besleria* subsection *Elongatae* of my revision. It will key out near *B. laxiflora* Benth., but that species is obviously not nearly allied, being distinguished by lesser pubescence, larger, serrulate leaf blades glabrate (rather than densely sericeous)

above, by elongate common peduncles, more numerous flowers in an umbel, generally larger calyx lobes, these attenuate into a mucro (rather than rounded and not mucronate), and by larger corollas, with a hairy ring within at base and glandular within the throat.

27. Besleria peruviana Fritsch, Repert. Sp. Nov. Fedde 18: 7. 1922.

Besleria peruviana var. *peruviana*. Known definitely only from the type collection, from La Merced, in Chanchamayo Valley, Prov. Tarma, Dept. Junín, at 700 to 800 m. alt., *Weberbauer* 1958 (B). Presumably the Berlin specimen was destroyed, but a photograph of it is in US. A second specimen possibly referable here is *Sandeman* 5170, from Chinchao Valley, Carpish Divide, Huánuco, 2,250 m., October 1945, which is more densely hirsute, and with somewhat smaller calyces and corollas; it is a subshrub or herb, said to be frequent in the forest in deep shade.

27a. Besleria peruviana var. **occulta** Morton, Contr. U.S. Nat. Herb. 26: 452. 1939. Still known only from the type: La Merced, Junín, at 700 m., *Killip & Smith* 24086 (US). It was described by the collectors as a herb 3 to 5 feet high, with elongate branches and bright orange-red flowers.

27b. Besleria peruviana var. **dissimilis** Morton. For a comment on this plant, see the account of *B. emendata* above.

28. Besleria capitata Poepp. & Endl. Nov. Gen. & Sp. 3: 2. 1845.

Known only from the type, Cuchero, Huánuco, *Poeppig* 1622 (W, Field photograph 32789) and Cuchero, *Poeppig* 1623 (B, photograph US).

29. Besleria racemosa Morton, Contr. U.S. Nat. Herb. 26: 450. 1939.

This species is still known only from the material originally cited, from San Martín and Junín, the specimens from Junín being dubiously exactly the same as the type from San Martín (Pongo de Cainarachi, Río Cainarachi, San Martín, 230 m., *Klug* 2660; holotype US, isotypes B, NY, S).

30. Besleria trichiata Morton, Contr. U.S. Nat. Herb. 26: 451. 1939.

Previously known only from the type collection, from Porvenir, Department of Junín, 1,500–1,900 m., *Killip & Smith* 25955 (US), but now represented by an additional collection: Between Fortaleza and San Lorenzo, Prov. Quispicanchis, Dept. Cuzco, 700 m., Oct. 22, 23, 1950, *Vargas* 9724 (US). According to Vargas' note, the corolla is red-salmon colored.

Section *Neobesleria* Morton, Contr. U.S. Nat. Herb. 26: 414. 1939.

Herbs or shrubs, the stems glabrate, strigillose or tomentose (hirsute in *B. wurdackii*); leaf blades mostly serrate, membranaceous, acuminate; common peduncle elongate or obsolete; calyx lobes free, often

toothed; corolla horizontal in the calyx, spurred at the posterior base; disk often reduced to a thick posterior gland, this often pubescent.

TYPE: *Besleria corallina* Fritsch.

Subsection *Axillares* Morton, Contr. U.S. Nat. Herb. 26: 416. 1939.

Herbs or soft woody shrubs; leaf blades serrate above the middle; common peduncle obsolete, the pedicels aggregate in the leaf axils; calyx lobes free, entire; corolla contracted in the throat, the limb terminal, small, regular.

TYPE: *Besleria gibbosa* (Poepp.) Hanst.

31. Besleria horizontalis Morton, sp. nov.

Suffrutex, caulibus apice strigillosis, mox glabris; folia per paria aequalia, breviter petiolata, laminis ellipticis acriter acuminatis, basi aequaliter cuneatis, supra medium serratis, subcoriaceis, supra glabris, subtus pallidioribus glabris costa strigillosa excepta; flores solitarii axillares, pedicellis elongatis; calycis lobi aequales imbricati suborbiculares rotundati integri externe strigillosi; corolla flava, tubo purpureo-maculato, in calyce horizontali, basi postice calcarato, externe dense piloso, supra medium ampliato in fauce non contracto, limbo terminali, lobis subaequalibus, externe vix pilosis eciliatis.

Woody subshrub, the stems unbranched upwardly, ca. 5 mm. in diameter ca. 30 cm. below tip, pale stramineous, with a few short, appressed hairs at the tip, below entirely glabrous; leaves of a pair equal, short-petiolate, the petioles up to 3 cm. long, thick, glabrous; leaf blades elliptic, 9–16 cm. long, 4–6 cm. wide, shortly and sharply acuminate at apex, subequally cuneate at base, subcoriaceous, obviously serrate above the middle, dark green and glabrous above, paler beneath, some few appressed hairs on midrib, otherwise glabrous, the primary veins 5 or 6 pairs, elevated beneath; flowers solitary, axillary, the pedicels ca. 2.5 cm. long, slightly enlarged at apex; calyx ca. 7 mm. long, the lobes nearly free, inbricate, suborbicular, ca. 6 mm. long and 5.5 mm. wide, rounded at apex, not mucronate, entire, apparently yellowish, thinly silky-strigillose externally; corolla yellow, the tube with dark purple spots, horizontal in calyx, ca. 30 mm. long, slightly spurred at the posterior base (ca. 3 mm.), the tube ca. 5 mm. wide at middle, enlarged to 9 mm. wide in throat, densely pilose externally, the limb terminal, ca. 11 mm. wide, the lobes subequal, ca. 3 mm. long and broad, sparsely pilose externally, entire.

Type in the U.S. National Herbarium, no. 1,877,283, collected in dense high forest, Alturas de Pintobamba, Province of Convención, Department of Cuzco, Peru, at 2,700 meters elevation, March 4, 1943, by C. Vargas C. (no. 3252).

This, the second species of section *Neobesleria*, subsection *Axillares*, known from Peru, differs from *B. wurdackii* in many characters, notably in the glabrous (or only sparsely strigillose apically) stems, glabrate leaves, solitary flowers, suborbicular, imbricate calyx lobes, and especially in the large corolla, with the tube enlarged to the throat rather than contracted. *Besleria gibbosa* (Poepp.) Hanst., of Amazonian Brazil, differs in the crowded, short (only 8 mm. long) pedicels, and the short (only 4.5 mm. long), ovate-oblong, acute, nonimbricate calyx lobes, among other characters.

32. Besleria wurdackii Morton, sp. nov.

Caules hirsuti; folia opposita aequalia, longe petiolata, lamina membranacea, late elliptica, acriter acuminata, basi obliqua, utrinque laxe hirsuta, conspicue serrata fere usque ad basim; flores axillares fasciculati, pedicellis gracilibus elongatis hirsutis; calycis lobi liberi subaequales ovato-lanceolati integri, apice attenuati et subulati, externe hirsuti eciliati; corolla flava 2 lobis posticis purpureis exceptis, in calyce subhorizontalis, basi postice leviter calcarata, ventricosa, externe hirsuta, intus glabra, in fauce contracta, limbo terminali subirregulari; filamenta glabra; ovarium pilosum; stylus basi pilosus; stigma bilobum; discus annularis leviter 5-lobatus altus glaber.

Soft-woody shrub ca. 1 m. high, the stems unbranched above, ca. 4 mm. in diameter at 30 cm. below tip, densely yellowish hirsute toward apex; leaves opposite, subequal, the lower long-petiolate (4–5 cm.), the upper short-petiolate (1.5 cm.), the petioles densely hirsute; leaf blades obliquely broadly elliptic, about twice as long as broad, 10–14 cm. long, 5–7 cm. wide, abruptly and sharply short-acuminate at apex, oblique at base, the lower base extending at nearly a right angle, the upper at an acute angle, conspicuously serrate nearly to the base, thin-membranaceous, persistently but finely hirsute on both sides, the primary veins 8–10 pairs; flowers several, fasciculate in the leaf axils, a common peduncle obsolete, the pedicels 2–2.5 cm. long, very slender, hirsute; calyx ca. 10 mm. long, the lobes free, ovate-lanceolate, ca. 3 mm. wide at the middle, subequal but the posterior reflexed, entire attenuate and subulate at apex, hirsute externally, glabrous within, not ciliate; corolla yellow except for the dark purplish two posterior lobes of the limb, oblique in the calyx or subhorizontal, slightly spurred at the posterior base (1 mm.), 14–16 mm. long, strongly ventricose, becoming ca. 8.5 mm. wide at the middle, contracted to the throat, this ca. 5.5 mm. wide, the tube strongly pilose externally, glabrous within, the limb terminal, slightly bilabiate, the two posterior lobes smaller, dark purplish, the other yellow; filaments glabrous; anthers broader than long, ca. 1.5 mm. long and 2 mm. wide, connate, the cells confluent; staminodium conspicuous,

ca. 5 mm. long; ovary strongly pilose; style pilose at base, ca. 7 mm. long; stigma bilobed; disk annular but irregularly 5-lobed, high, ca. 1.5 mm. long, glabrous.

Type in the U.S. National Herbarium, no. 2,404,369, collected on the left bank of Río Marañon, above Cascadas de Mayasi, opposite km. 278 of the Marañon road, Province of Bagua, Department of Amazonas, Peru, at 425–500 m. elevation, Sept. 12, 1962 by J. J. Wurdack (no. 1955). This species belongs in section *Neobesleria*, subsection *Axillares*. The only previously known species of this section with a hirsute type of pubescence is *B. obliqua* Morton, of Panama, which differs in the glabrous corolla tube, smaller and differently shaped calyx lobes, smaller, not serrate leaves, and in many other ways.

Subsection Corallinae Morton, Contr. U.S. Nat. Herb. 26: 414. 1939.

Leaf blades serrate or crenate; common peduncle elongate, longer than the pedicels; calyx lobes free, imbricate, serrate or denticulate, pubescent on both sides; corolla contracted in the throat, the limb terminal, small, regular; disk semiannular, pubescent.

Type: *Besleria corallina* Fritsch.

33. Besleria corallina Fritsch, Repert. Sp. Nov. Fedde 18: 13. 1922.

Known from the Department of Loreto and adjacent Putumayo, Colombia. The type came from Cerro de Ponasa, *Ule* 6671 (holotype B; photograph US). A collection that has not been previously reported is: Gamitanacocha, Río Mazán, Loreto, 100–125 m., *J. M. Schunke* 198 (US).

Subsection Maculatae Morton, Contr. U.S. Nat. Herb. 26: 415. 1939.

Shrubs, the stems densely lanate-tomentose; leaf blades serrate; common peduncle elongate, 6–7.5 cm. long, the pedicles much shorter; calyx lobes free, ovate to ovate-lanceolate, acuminate, sharply serrate, glabrous within; corolla yellow with conspicuous small maroon spots on tube and within lobes, the throat not contracted, the limb terminal, slightly bilabiate; ovary villous; disk reduced to a thick, puberulous, posterior gland.

Type: *Besleria rupestris* Morton.

34. Besleria rupestris Morton, Proc. Biol. Soc. Washington 48: 57. 1935.

The type came from Ecuador (between Baños and Cashurco, Prov. Tungurahua, 1,300–1,800 m., *Hitchcock* 21820, US). This is one of the more widely distributed species, for it is known from Colombia (Dept. of El Cauca and El Valle) as well as from Peru, in the Departments of Junín (*Killip & Smith* 25759) and Huánuco (*Mexía* 8237), as previously reported (Contr. U.S. Nat. Herb. 26: 462. 1939), and

from Cuzco: Between Tanamayo and Santa Isabel, Prov. Paucartambo, 1,600 m., Dec. 6, 1947, *Vargas* 6794. There may be some variation in habit, for some collections indicate this species to be an erect herb ca. 80 cm. high, but one says that it is scandent and up to 1.5 m. high. The corollas are probably unique in the genus in having the lobes and tube within conspicuously but minutely spotted.

Section *Gasteranthus* (Benth.) Fritsch, *in* Engl. & Prantl, Nat. Pflanzenfam. 4(3b): 159. 1895

Gasteranthus Benth. Pl. Hartweg. 233. 1846.

Herbs or shrubs; leaf blades mostly toothed; common peduncle elongate; calyx lobes ovate to lanceolate or obovate, less than half as long as the corolla tube; corolla horizontal in calyx, spurred at posterior base, strongly ventricose, the tube inflated at apex and surpassing the limb, the limb small, regular, dorsal, facing upwardly; disk thickened posteriorly or reduced to a posterior gland.

TYPE: *Besleria quitensis* (Benth.) Hanst.

In my revision I erroneously attributed the sectional name *Gasteranthus* to Bentham and Hooker, but Bentham and Hooker did not formally recognize any sections in *Besleria*, as they did in some other genera of Gesneriaceae.

35. Besleria caligula Morton, sp. nov.

Suffrutex, caulibus non ramosis, glaberrimis; folia inaequalia, breviter petiolata, lamina anguste elliptica, longe acuminata, basi oblique cuneata, serrata, utrinque glaberrima; inflorescentiae subumbellatae vel subcorymbosae, longe pedunculatae, pedicellis crassis, glabris; calycis lobi inaequales, membranacei, integri, obtusi vel rotundati, glabri, apiculati, posticus deflexus latus; corolla horizontalis, aurantiaca, calcarata, valde inflata, utrinque glabra, limbo dorsali non terminali parvo regulari; androecium et gynoecium glabra; discus postice valde incrassatus glaber.

Subshrub ca. 50 cm. high; stems unbranched, ca. 4 mm. in diameter ca. 30 cm. below apex; leaves of a pair usually strongly unequal, one less than one-fifth as long as the other, all short-petiolate, the petioles ca. 10 mm. long, glabrous; larger leaf blades narrowly elliptic, 11×5 cm. up to 19×6 cm., long-acuminate at apex, obliquely cuneate at base, conspicuously serrulate, the teeth 18–24 on each side, thin-herbaceous, green above, paler beneath, entirely glabrous on both sides, the primary veins 12–15 pairs, ascending, anastomosing within the margin; inflorescences axillary, subumbellate or subcorymbose, the common peduncle 5–7 cm. long, thick, glabrous, the pedicels 4–6, short and thick, 8–10 mm. long, glabrous; calyx in flower ca. 7 mm. high and 15 mm. broad, irregular, the lobes free, thin-membranous,

entire, glabrous on both sides, 5-nerved, the midrib thickened upwardly and excurrent in a short apiculus, the 2 anterior obovate, ca. 7 mm. long and 5.5 mm. broad, narrowed to base, broadest above middle, rounded at apex, the 2 lateral broadly elliptic, ca. 7 mm. long and 5 mm. broad, broadest at middle, slightly narrowed downwardly and upwardly, obtuse, the posterior deflexed in anthesis, ca. 7.5 mm. long, broader than long and ca. 8 mm. broad, carinate and somewhat folded around the corolla spur, prominently apiculate, the midrib thickened; corolla orange, ca. 25 mm. long, horizontal in calyx, spurred at posterior base, the spur ca. 2.5 mm. long, acutish, the basal orifice ca. 2.5 mm. broad, the tube ca. 4 mm. broad at little above the base, strongly enlarged upwardly and becoming ventricose-saccate at apex, here 15 mm. broad, glabrous without and within, the limb regular, dorsal and not terminal, facing upwardly, ca. 6 mm. broad, the lobes minute, semicircular, ca. 1.5 mm. long, 3 mm. broad, glabrous, not ciliate; filaments thick, ca. 12–15 mm. long, not coiled, glabrous; anthers included within the saccate portion of the tube, free at anthesis, glabrous, broader than long, ca. 1.5 mm. long, 2 mm. broad, the cells completely confluent in anthesis; ovary conic, 3–4 mm. long, entirely glabrous; style included, thick, glabrous, ca. 8 mm. long; stigma bilobed; disk essentially reduced to a large, thick, fleshy, bilobed, glabrous, posterior gland ca. 1.2 mm. high and 1.3 mm. thick, the anterior portion reduced to a mere remnant; calyx lobes somewhat accrescent after anthesis; fruit unknown.

Type in the U.S. National Herbarium, no. 2,404,445, collected in rain forest on the lower northwestern slopes of Cerros Campanquiz, near the Río Marañon just above Pongo de Manseriche, Province of Alto Amazonas, Department of Loreto, Peru, at 250–350 meters elevation, Oct. 17, 1962, by J. J. Wurdack (no. 2277). Isotypes in Lima (not seen) and Kew.

This is the first species of the section *Gasteranthus* to be known from Peru. The plants of this section have slipper-like flowers, with the inflated corolla tube terminal and the orifice of the corolla minute and facing upwardly on the upper side some distance back from the tip of the corolla. The peculiar form may be correlated with the mode of pollination, but this is unknown; the brightly colored flowers of yellow, orange, or red probably indicate an insect pollinator. The other species of this section are confined to Ecuador and Colombia, with one outlier in Guatemala. The most closely related species is *Besleria calceolus* Fritsch (Repert. Sp. Nov. Fedde 18: 12. 1922), which is still known only from the type collection from the Montaña de Canelos, Ecuador (*Spruce* 5069); since the holotype at Berlin is probably destroyed, I here designate the specimen of this collection in the Royal Botanic Gardens, Kew, as lectotype. The epithet "*cal-*

ceolus" chosen by Fritsch means "little slipper" in Latin, and I have chosen another equivalent "*caligula.*" These two species may be distinguished by the following key:

Calyx lobes unequal, the 2 anterior obovate, the 2 lateral broadly elliptic, the posterior broader than long, all 7–7.5 mm. long, entirely glabrous; petioles ca. 1 cm. long; stems and leaves entirely glabrous; primary veins 12–15 pairs; corolla glabrous externally; ovary glabrous . . . . . **B. caligula**

Calyx lobes ovate-lanceolate, acuminate, subequal, the posterior somewhat broader, all 6 mm. long or less, slightly pilosulous externally; petioles 2–4 cm. long; stems at apex and leaf veins beneath minutely strigillose; primary veins 9 or 10 pairs; corolla tube sparsely pilosulous without; ovary with a few hairs at apex . . . . . **B. calceolus**

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THE GENERA, SUBGENERA, AND SECTIONS OF THE HYMENOPHYLLACEAE

By C. V. MORTON

ERRATA

Page 182, line 21: delete "T. cellulosum Kl."

Page 196, line 16: read "...includes only the three species T. arbuscula Desv., T. bicorne Hook., and T. cellulosum Kl...."

Page 211: under "T. cellulosum," delete 182, add 196.

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THE GENERA, SUBGENERA, AND SECTIONS OF THE HYMENOPHYLLACEAE

C. V. Morton

Pteridologists have been attracted to the filmy-fern family Hymenophyllaceae for many years because of the variety and beauty of its species and its peculiar morphological structure. Presl, van den Bosch, Mettenius, Prantl, and Giesenhagen were all interested in the group and each contributed many important observations. Most of these workers recognized two large traditional genera, *Trichomanes* L. and *Hymenophyllum* J. E. Smith, although Presl and Prantl did segregate some additional genera, in Presl's case sometimes by faulty observations. The oriental species were revised some 30 years ago by the late E. B. Copeland; no real monograph has ever been produced, although one is needed since these are among the commonest plants of the tropical forests at middle elevations in both the Old and the New Worlds.

Christensen in the "Index Filicum" gave two classifications of *Trichomanes* that are contradictory in part. On page 634 of the Index (issued July 2, 1906) he named seven subgenera and arranged the species by means of symbols, following Prantl's classification. In the introductory pages of the Index (pp. XIV, XV, after Sept. 15, 1906) he gave a different and better classification, which has, however, been less known. Here he recognized eight subgenera with many sections, almost all with a lectotype indicated, although this was wrongly chosen in some instances according to our present International Code of Botanical Nomenclature.

The late E. B. Copeland published in 1933 a revision of the Old World species of *Trichomanes* [1] and a similar treatment of the Old World *Hymenophyllum* in 1937,[2] both beautifully illustrated with line drawings. In *Trichomanes* he recognized a number of groups called *Pyxidifera*, *Scandentia*, *Grandia*, *Apiifolia*, *Rigida*, etc., but these cannot be considered as validly published names, since "group" is not a recognized taxonomic category. In *Hymenophyllum*, however, he

[1] Phil. Journ. Sci. 51: 119–280, pls. 1–61.

[2] Op. cit. 64: 1–188, pls. 1–89.

recognized a number of groups definitely called subgenera. In 1938, Copeland [3] in his "Genera Hymenophyllacearum" raised most of the previously recognized groups and subgenera to generic rank, a total of 33 genera being recognized. A few years later, I published a review [4] critical of this work and questioned the necessity of recognizing so many genera, some of which were separated by characters hardly more than specific it would seem, such as "fronds harsh in texture" opposed to "fronds soft in texture," or "fronds once-pinnate" opposed to "fronds more divided," or "margin naked" opposed to "margin hairy," and so forth. Essentially the same treatment of the family was presented by Copeland in his "Genera Filicum" (1947), but during continued work in the last 25 years I have seen no reason for changing my previous opinion.

Due to the prestige of Copeland, his system has been accepted by many workers without a truly critical examination of the basis of this system; however, the most eminent students, such as Christensen, Alston, Madame Tardieu-Blot, E.A.C.L.E. Schelpe, W. A. Sledge, R. M. Tryon, and R. E. Holttum have not accepted it. Copeland's defense of his system is that the traditional character of distinction, a 2-valved, only partly immersed involucre in *Hymenophyllum* and a tubular, almost wholly immersed involucre in *Trichomanes*, is a variable and unreliable character. Nevertheless, he uses only this character of "involucre valvate" as opposed to "involucre tubular or obconic" to separate his groups of genera in the keys both in the "Genera Hymenophyllacearum" and the "Genera Filicum" without seeming to realize that he is contradicting himself. If a multitude of genera can be separated by this character then the two traditional ones can be also. As a matter of fact, about 98 percent of the species fall easily into one group or the other without difficulty. The presence of a few species that are somewhat equivocal in this character need not invalidate the genuine unity of the traditional genera *Trichomanes* and *Hymenophyllum*, which are not separated solely by this character, as Copeland would seem to imply. There are other differences, as one would expect between good genera, and a fern specialist with some experience with the family can almost always place sterile specimens in one genus or the other correctly and without difficulty. The differences are a little subtle perhaps. *Hymenophyllum* usually has a more elastic frond, which often curls up on the sheet when dried; the fronds are usually a red-brown when dry, whereas those of *Trichomanes* are more usually persistently green. *Hymenophyllum* is always epiphytic or rupicolous, whereas *Trichomanes* is not infrequently terrestrial. The rhizones of *Hymenophyllum* are always widely creeping and the

[3] Op. cit. 67: 1–110, pls. 1–11.

[4] Amer. Fern Journ. 32: 30, 31. 1942.

fronds scattered, and they are always relatively slender and with pale rhizome hairs. *Trichomanes* often has thicker rhizomes, and in some groups these are contracted so that the fronds are clustered; they often have dark, blackish rhizome hairs. The stipes, too, tend to be thicker. The fronds of *Hymenophyllum* are usually more divided and simple blades do not occur, except in the aberrant *H. marginatum*. The cells of the fronds of *Trichomanes* often are larger and coarser, with thicker walls, these sometimes pitted. A number of species of *Trichomanes* are characterized also by the presence of false veins, which do not occur in *Hymenophyllum*. The segment margins are sometimes toothed in *Hymenophyllum*, never in *Trichomanes*. Stalked, stellate hairs occur in many *Hymenophyllum* (although there are many glabrous species also), and such hairs are perhaps not found in *Trichomanes*, although a few species do have sessile, stellate hairs. The venation pattern in *Hymenophyllum* is always anadromous and the soriation "paratact" (see p. 158), as Prantl termed it, but in *Trichomanes* many species are catadromous and "epitact," a character that seems to me to be fundamental but which Copeland essentially ignored. As pointed out by Bower, Stokey, and others, important gametophytic differences also occur between the two genera, although relatively few species have been investigated in this regard. *Trichomanes* and *Hymenophyllum* seem to differ in a great many more characters than merely the form of the involucre, important as that is. Therefore, it seems right that the traditional division into two major genera be maintained, and that the convenience of the general botanist and taxonomist will be better served by this treatment. It is clear that by the characters noted above the general botanist can recognize the traditional genera rather readily, but that only a specialist could recognize and remember the 33 genera of Copeland.

A word as to Copeland's general philosophy may well point up our basic difference in views. Although he would have vigorously disclaimed it, Copeland was an old-fashioned botanist in his general ideas, having been brought up under the influence of L. M. Underwood and N. L. Britton in the "New York" school of taxonomy back at the turn of the century. In general, he kept to the ideas of this school of thought that a plant was either a good species or it was nothing at all, a mere synonym. In his later years, at least, he never recognized any subspecies or varieties (cf. his treatments of the ferns of New Guinea, the "Fern Flora of the Philippines" and his "monographs" of *Grammitis* and *Ctenopteris*). Similarly, his larger groups were either full-fledged genera or else synonyms, with never or seldom any subgenera, sections, or subsections; instead all the species were massed together with no grouping. Similarly at the family level, Copeland split up the traditional Polypodiaceae into a number of

families, but he never recognized any subfamilies, tribes, or subtribes within them. There was no classification of the genera. He was thus essentially destroying the classification that had been carefully built up by Diels, Christensen, and previous workers. It was a flattening and leveling out process whereby only essentially three categories, family, genus, and species, were recognized. With such a philosophy it is understandable that he would find smaller families and smaller genera more "convenient."

However, this is not the traditional conception that has come down to us from the botanical masters of the past, who recognized that there are such things as subfamilies and tribes, that subgenera and sections do exist, and that species are not uniform but are divisible into subspecies and varieties. It is true that one can go to an extreme in subdividing ad infinitum, as was the case with some of the workers of the Englerian school, but this is preferable to an absence of classification, provided of course that the subdivisions are reasonably homogeneous and natural, as they are apt to be if subdivided finely enough. A middle course is certainly preferable. Just how much segregation into named groups is desirable depends largely on the size and variability of the group concerned. In the case of the Polypodiaceae, no one has shown that it is necessary to recognize a large number of segregate families (or even a smaller number), when the recognition of these groups as subfamilies is equally convenient. The only justification would be on theoretical grounds that these "families" had a different origin, i.e., that the family Polypodiaceae sens. lat. is polyphyletic. This has been claimed but not proved and is logically unlikely considering the relative uniformity of the Polypodiaceae sens. lat. in fundamental characters. Certain subfamilies like Adiantoideae show some similarities to the more primitive family Schizaeaceae, for instance, but in their sporangia, annulus, stomium, spores, embryos, gametophytes, and sex organs the Adiantoideae are similar to the Dryopteridoideae, Asplenioideae, and other subfamilies of Polypodiaceae, and a great gap exists between all of these and the Schizaeaceae. If there are relationships with the Schizaeaceae it would be with the whole family Polypodiaceae and not just with the subfamily Adiantoideae.

The situation is quite different in the Hymenophyllaceae, a very natural group and an obvious family it would seem; however, an extreme splitter like G. Kunkel instead of minimizing the differences between *Trichomanes* and *Hymenophyllum* has overvalued them and proposed to separate them into two different families, the Hymenophyllaceae and Trichomanaeaceae,[5] without having brought out any

[5] Repert. Sp. Nov. Fedde 70: 155. 1965.

new characters of family importance, or indeed without an adequate discussion of the existing characters. Several workers have divided the family into subfamilies, one for each of the traditional genera, but this too seems unnecessary, for the fineness of subdivision should depend on the size of the groups concerned. In their inclusive sense, both *Hymenophyllum* and *Trichomanes* are large enough genera that a classification of the species is surely needed, and therefore a division into several subgenera, some of them with several sections, seems to be a logical and usable procedure.

The system set forth below is not in any sense original. It has not been expressed in exactly this way before but is adapted from the work of my predecessors. I have tried to pick out the best ideas of Presl, van den Bosch, Prantl, Christensen, and Copeland, and to unite them into a system. It is based in part on general knowledge of the family, acquired over about 38 years of study, but not on a really intensive study of all the species, as it ideally should. A number of species are almost unknown to me, and these are some of the most critical ones so far as their placing in the system is concerned. For this reason I leave some groups in an uncertain position, pending further study, by me or others. No doubt their relationships can be determined definitely when proper material is available and is studied completely. Unfortunately, some of these critical species are extremely rare and hard to come by in good condition.

The trickiest and in a sense one of the most difficult problems has been to typify properly the various names that have been proposed. Our present Code rightly requires that names be typified, or otherwise their application is indefinite and subject to change. Types were suggested for many names by Christensen in the preliminary pages of the "Index Filicum" (after Sept. 15, 1906) and by Copeland, but the choices have not always been in accord with the current rules set down in the Code. In particular, Christensen often designated as type a species that was not one of the original species of the genus, but which he thought, rightly or wrongly, to be a taxonomic synonym. Copeland's chief idea in choosing a type was to take the first species cited, but this arbitrary system is not only unacceptable but is specifically condemned in the Code, which indicates that all the species cited must be taken into account, and in particular that the designation of a lectotype by a previous author must stand unless it can be shown that is does not agree with the original description or was selected by some sort of erroneous conception. However, this study of typification has shown that almost all the groups I accept already have available acceptable names.

It might be thought that chromosome numbers would give some useful information as to the proper subgeneric and sectional distri-

bution, and it is likely that they will ultimately. However, only relatively few species have been counted and hundreds of additional counts of properly identified material will have to be taken before any definite statements can be made. At the present time the information is extremely indecisive and inconclusive. The Hymenophyllaceae have relatively low chromosome numbers, compared to the ferns in general, and so it would appear that counts would be made more easily, but this does not seem to be the case. It appears that several basic numbers are in the family ($x=7$, 9, 11, 13, or 17), but different basic numbers appear in closely allied species that obviously belong in the same section, the group known as "*Meringium*" having basic numbers of 7, 11, 13, and 21 reported. Indeed within the typical and small section *Hymenophyllum* itself there is no agreement: The type species of the genus *H. tunbridgense* is reported by Manton as $n=13$; Brownlie reported that *H. peltatum* has $n=11$, and yet Manton reported $n=18$ in *H. unilaterale*, which is not only close to *H. peltatum* but is generally regarded and probably correctly as a complete synonym. It is likely that the species counted by Manton was really *H. wilsonii* Hook., generally considered another synonym of *H. peltatum*, and may not differ other than in chromosome count. In all events they are closely allied and belong in the same section. So far as known, the species of Copeland's groups "*Mecodium*" and "*Sphaerocionium*" are more uniform, often having $n=36$, which is assumed to be from a base of $x=9$.

The genus *Trichomanes* gives an indication of different base numbers from *Hymenophyllum*, although $x=9$ does occur too. Trevor Walker has given a most interesting and valuable summary [6] of the results of his counts of 19 Jamaican species, which seems to show that base numbers of $x=7$ and $x=8$ are operative, although $x=11$ and $x=17$ also occur. It appears from the data available that subg. *Didymoglossum* is uniform with $n=34$ or 68 (presumably $x=17$), subg. *Achomanes* often at least has $n=32$ or 64 (presumably $x=8$), and subg. *Trichomanes* (as I recognize it) at least in part as $x=9$ (although other numbers such as $x=17$ also occur). The study of chromosome numbers in the future will be fascinating and will certainly shed new light on relationships and appropriate taxonomic groupings. However, some of the reported counts should be regarded with great discretion, for the numerous discrepancies may indicate errors in counting or errors in identification, or both.

A word should be said about the key characters used as primary ones. The terms "paratactic" or "paratact" and "epitactic" or "epitact" were invented by Prantl [7] to describe the positioning of the sori in

[6] Trans. Roy. Soc. Edinburgh 66: 169–237, *pls. 1–5*. 1966.

[7] Untersuch. Morph. Gefässkrypt. 1: 3–14. 1875.

the Hymenophyllaceae, and this positioning is correlated with the venation type. In anadromous venation, the first vein of a primary pinna or the first veinlet of a secondary pinnule points toward the apex of the blade or the pinna, respectively. The sorus is borne on the tip of a proximal veinlet, so that a distal vein or veinlet is free to continue growth and branch further; in other words there is at least the possibility of indeterminate growth. This is the paratactic type. Catadromous venation, in which the first vein faces downward, toward the base of the frond is accompanied by sori that terminate distal veins or veinlets. A proximal veinlet may or may not also be terminated by a sorus. The result is that such fronds with epitactic soriation are determinate, both in the growth of the fronds themselves and the individual pinnae, at least theoretically. After a pinna or a frond apex becomes fertile no more growth is possible since the distal veins that could have continued growth have been stopped by the production of a sorus. Of course, some fronds do continue to grow at the apex because they have not become fertile, and so this character is best shown by the lateral pinnae, and especially by the positioning of the sorus on a distal branch of a veinlet rather than a proximal. Although Copeland knew of this character from Prantl's exposition, he minimized its importance and did not truly employ it in his classification. It is probably a fundamental character, although sometimes it may be difficult to interpret, especially in plants where the fronds have become very dwarfed or even simple (as in some species of subg. *Didymoglossum*), when the character of catadromous venation can hardly be made out, for this is a character, like rhachis structure, that always is more determinable in compound fronds. Occasionally, especially in simple-bladed types like *Hymenoglossum* and *Cardiomanes*, all the veinlets may be fertile, a type of soriation called "pantotactic" by Prantl, an advanced type obviously correlated with simplicity.

The lists of species belonging to the various sections given in this paper do not represent in many cases my own personal study. I do know many of the American species, but the Old World ones are largely placed following the list given by Copeland in his "Genera Hymenophyllacearum." This list is in turn partly the result of Copeland's own studies and partly taken from Christensen's "Index Filicum." And so, although most species will be properly placed, some errors may need to be corrected by future studies. There are many more names than are mentioned here. Most of these are synonyms, the disposition of which can be found from the "Index Filicum" and from Copeland's papers. Some others have not been studied and are of doubtful disposition at present.

Key to the Genera of Hymenophyllaceae

Involucre bivalved throughout or at least to the middle, the immersed part, if any, cuplike or conic and not tubular; fronds usually brown or red when dried, glabrous or often hairy, generally elastic, the margins entire or toothed; rhizomes always epiphytic or rupicolous, long-creeping with scattered fronds, usually slender, with pale rhizoids; cells of blade often small, with smooth walls, but not always; false veins absent; venation anadromous; sori paratactic or pantotactic; receptacle typically included or only slightly exserted from involucre, typically sporangiiferous toward apex only.

Frond simple, large, long-stipitate, ovate to lanceolate, subentire, the marginal cells in two rows and forming a dark border, the laminal veins parallel. Chile . . . . . **I. Hymenoglossum**

Fronds not simple, large, long-stipitate, or subentire.

Fronds minute and mosslike, simply pinnate with entire, leaflike pinnae, the stipe bearing rhizoids and scarcely distinguishable from the rhizomes, the axis red-pilose. Antarctic South America . . . . **II. Serpyllopsis**

Fronds otherwise, the stipe not bearing rhizoids.

Ultimate segments (pinnae) large, dimidiate, with several dark black, thick, forked veins, the outer curving around in a submarginal position but leaving several rows of undifferentiated marginal parenchyma cells. New Caledonia. . . . . **III. Rosenstockia**

Ultimate segments without plural veins, always with a single vein, this not black (or in *H. heimii* the blade simply pinnatilobate). **IV. Hymenophyllum**

Involucre tubular or conic throughout with a truncate apex, or with two lips less than half as long as the tube; fronds often green, mostly glabrous but sometimes hairy, but then usually without stellate hairs, generally not especially elastic, the margins entire; rhizomes terrestrial or epiphytic, often thicker than in *Hymenophyllum*, widely creeping or contracted or even erect, with scattered or approximate fronds; cells of blade often large, and sometimes with thickened walls; false veins in the position of veins or marginal false veins sometimes present; venation anadromous or catadromous; sori paratactic or epitactic, or rarely pantotactic; receptacle typically exserted, typically sporangiiferous to the base but not to the apex.

Fronds simple, reniform, large, long-stipitate, ca. 4 cells thick. New Zealand. **V. Cardiomanes**

Fronds not simple, reniform and long-stipitate . . . . . **VI. Trichomanes**

I. *Hymenoglossum*

Hymenoglossum Presl, Hymen. 35. 1843.

Hymenophyllum sect. *Hymenoglossum* (Presl) Moore, Ind. Fil. cxii. 1857.

TYPE: *Hymenophyllum cruentum* Cav.=*Hymenoglossum cruentum* (Cav.) Presl.

Although in general characters this genus is not particularly different from *Hymenophyllum*, it is so peculiar and isolated that its affinities really are not known and it can rank as a monotypic genus. The 2-rowed, differentiated band of black marginal cells are unlike any other marginal cells in *Hymenophyllum*, although they may be somewhat comparable to those of *Hymenophyllum* subg. *Craspedophyllum*, in which the marginal cells are dark and thickened, but differently placed

and in only one row. This species appears to be quite common in certain parts of the western slopes of the Andes in Chile, but appears not to have been able to cross the Andes into the comparable region of Argentina on the eastern slopes.

II. *Serpyllopsis*

Serpyllopsis v. d. Bosch, Versl. Meded. Konink. Akad. Wetens. Afd. Natuurk. 11: 318. 1861.

Hymenophyllum subg. *Cycloglossum* Presl, Hymen. 32. 1843. Lectotype: There were six original species: *H. caespitosum* Gaud., *H. cumingii* Presl, *H. semibivalve* Hook. & Grev., *H. decurrens* (Jacq.) Swartz, *H. kohautianum* Presl, and *H. schomburgkii* Presl (ined.). Christensen [8] indicated the type as *H. decurrens* (Jacq.) Swartz, but inasmuch as this species has never been identified and presumably was as unknown to Presl as it has been to others, it is not a suitable choice of lectotype. Copeland [9] indicated the type as *H. caespitosum* Gaud., probably on the basis that this was the first species listed by Presl, and this must be accepted as a choice of lectotype. It is in fact a desirable lectotype, for if another lectotype were to be chosen subg. *Cycloglossum* would have priority over and would have to replace subg. *Mecodium*, which is now a fairly well-known name due to Copeland's use.

Trichomanes subg. *Serpyllopsis* (v.d. Bosch) Christ, Farnkr. Erde 23. 1897.

Hymenophyllum subg. *Euhymenophyllum* sect. *Cycloglossum* (Presl) C. Chr. Ind. Fil. XV. 1906.

TYPE: *Trichomanes caespitosum* Gaud.=*Serpyllopsis caespitosa* (Gaud.) C. Chr.

This small, monotypic Antarctic genus is of uncertain relationship, showing characters of both *Hymenophyllum* and *Trichomanes*. In its general appearance it suggests a bryophyte rather than a member of the Hymenophyllaceae, although it is certainly of the family.

III. *Rosenstockia*

Rosenstockia Copel. Gen. Fil. 36. 1947.

TYPE: *Hymenophyllum rolandi-principis* Rosenst.=*Rosenstockia rolandi-principis* (Rosenst.) Copel.

This is one of the most peculiar and distinctive of all fern genera, and probably one of the rarest, known only from about three collections from New Caledonia. The structure of the dark, coarse veins has not been investigated anatomically, but it may very well be quite different from the normal vein structure of the Hymenophyllaceae. The alliance, by reason of the involucres, is surely with *Hymenophyllum*. The structurally somewhat similar group in *Trichomanes* with large segments with plural veins (subg. *Phlebiophyllum*) is less distinctive and more typical of its genus in other characters.

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[8] Ind. Fil. XV. 1906.

[9] Phil. Journ. Sci. 67: 14. 1938.

IV. *Hymenophyllum*

Hymenophyllum is a large, common genus in the tropics of both hemispheres, and it is well known and usually recognized by the general botanist. It really is quite uniform and its segregation into small genera is not only inconvenient but unnecessary, since all the species are closely related. Several writers have remarked that Copeland's segregates from *Hymenophyllum* are less distinct than those from *Trichomanes*, as by Miss Tindale in her recent fine treatment of the species of New South Wales,[10] where most of the segregates are kept within *Hymenophyllum* as subgenera but those from *Trichomanes* recognized as genera. This is possible and somewhat a matter of opinion. However, the easier recognizability of some of the segregates from *Trichomanes* (but not all, by any means) does not require that they be recognized as genera rather than subgenera. *Trichomanes* is the larger genus and has varied more, for instance by sometimes assuming a terrestrial habitat, which necessitates a change in the rhizomes and in frond disposition. In its general structure and especially in its involucres *Trichomanes* is rather uniform and readily separated from *Hymenophyllum*, with the exception of a few aberrant species. There is no reason to suspect a polyphyletic origin and thus no theoretical or practical need to recognize a large number of segregate genera. Convenience in identification work, in anatomical and cytological study, and in herbarium arrangement is equally well served by recognizing a suitable number of subgenera and sections.

Key to *Hymenophyllum*

Margins of the segments toothed, the teeth not tipped by hairs or if rarely so, the hairs several cells long; involucre often somewhat conic at base.
Subg. **1. Hymenophyllum**

Margins of the segments entire, or if rarely apparently slightly denticulate, the teeth tipped by one-celled or stellate hairs; receptacle typically included within the involucre, but sometimes exserted, the involucre rounded, cup-like, or conic at base.

Blades variously hairy, at least on the margins or veins beneath.
Subg. **2. Sphaerocionium**

Blades glabrous.

Blades with a conspicuous row of black, differentiated marginal cells, simple or forked, one-veined. Australia, Tasmania, and New Zealand.
Subg. **3. Craspedophyllum**

Blades without a black margin or differentiated cells, pinnatifid to decompound.

Involucres immersed and urceolate and cuplike at base. Australia.
Subg. **4. Hemicyatheon**

Involucres mostly free at base or if immersed then usually not rounded and cuplike . . . . . Subg. **5. Mecodium**

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[10] Contr. New South Wales Nat. Herb., Flora Ser. 201: 1–49, *pls. 1–7*. 1963.

Subg. 1. *Hymenophyllum*

Lamina with normal laminal surface, sometimes with accessory teeth.
Sori directed in a plane more or less perpendicular to the plane of the lamina, arched at the base and somewhat pedunculate; receptacle clavate, almost covered with sporangia to the base, only slightly exserted.
Sect. **1. Hymenophyllum**
Sori directed in the plane of the lamina, not arched at the base or pedunculate; receptacle cylindrical to globose, generally without sporangia at the base, often exserted.
Teeth or wings present in planes perpendicular to the blade; receptacle globose to clavate. Peru and Ecuador . . . . . Sect. **2. Buesia**
Teeth or wings absent in planes perpendicular to the blade; receptacle clavate to linear.
Pinnae symmetrical, more or less equally developed on both sides; receptacle cylindric, thickened at base, exserted. . Sect. **3. Ptychophyllum**
Pinnae asymmetrical, with segments developed mostly or entirely on the acroscopic side; receptacle filiform, somewhat slender at the base, thickened at the middle, included. South America.
Sect. **4. Eupectinum**
Lamina reduced mostly to discrete teeth spreading in various planes. New Guinea.
Sect. **5. Myriodon**

Subg. 2. *Sphaerocionium*

Blades essentially reduced to filiform processes bearing stellate marginal hairs. New Zealand . . . . . Sect. **7. Apteropteris**
Blades with normal laminar surfaces . . . . . Sect. **6. Sphaerocionium**
Blades with hairs borne only on the margins and veins (sometimes only on the veins beneath) . . . . . Subsect. **Ciliata**
Blades with the hairs borne on the leaf-surfaces as well as on the margins and veins.
Veins with accessory wings not in the plane of the fronds. West Indies; Central and South America . . . . . Subsect. **Plumosa**
Veins lacking accessory wings not in the plane of the frond.
Hairs, or at least some of them, stellate and stalked . . Subsect. **Hirsuta**
Hairs all simple or basally paired. Southern South America.
Subsect. **Leptocionium**

Subg. 3. *Craspedophyllum*

A single section. Australia, Tasmania, and New Zealand.
Sect. **8. Craspedophyllum**

Subg. 4. *Hemicyatheon*

A single section. Australia . . . . . Sect. **9. Hemicyatheon**

Subg. 5. *Mecodium*

Blades one cell thick throughout (except the veins) . . . . Sect. **10. Mecodium**
Veins without accessory wings not in the plane of the lamina.
Subsect. **Mecodium**
Veins with accessory wings not in the plane of the lamina. Java and New Guinea.
Subsect. **Amphipterum**

Blades 2- or 3-celled thick at least in part. Australia and New Zealand.
Subsect. **Diplophyllum**

Subg. 1. *Hymenophyllum*

Hymenophyllum sect. **1. Hymenophyllum**

Hymenophyllum J. E. Smith, Mem. Acad. Turin 5: 418. 1793. Lectotype: *Hymenophyllum tunbridgense* (L.) J. E. Smith, selected by Presl, Hymen. 31. 1843. Copeland in his revision of *Hymenophyllum* [11] indicated that *H. tunbridgense* was the type because it was the sole original species, which is not true; there were nine original species, of which *Trichomanes tunbridgense* L., the first named, was the logical choice for a type, since it was the oldest and best known.

Ptychomanes Hedwig, Fil. Gen. & Sp. in nota sub *Trichomanes asplenioides*. 1800. An illegitimate change of name of *Hymenophyllum* J. E. Smith on etymological grounds; it has therefore the same type species, *Trichomanes tunbridgense* L.

Hymenophyllum subg. *Euhymenophyllum* Presl, Hymen. 31. 1843.

Hymenophyllum subg. *Sphaerodium* Presl, Hymen. 31. 1843. Lectotype: *Hymenophyllum wilsonii* Hook., selected by Copeland, Phil. Journ. Sci. 67: 14. 1938. In the "Index Filicum" (p. XVI) the type is erroneously indicated as *H. tunbridgense* L., which was not one of the original species of this subgenus, and which in fact Presl was trying to distinguish from *Euhymenophyllum*, as typified by *H. tunbridgense*, but on what grounds is not entirely clear.

Hymenophyllum subg. *Leptocionium* sect. *Sphaerodium* (Presl) C. Chr. Ind. Fil. XVI. 1906 (lectotype *T. tunbridgense* incorrect, as indicated above).

Hymenophyllum subg. *Euhymenophyllum* [sect.] *Serrulata* Presl, Hymen. 32. 1843. Lectotype: *H. tunbridgense* L.

Hymenophyllum subg. *Euhymenophyllum* [sect.] *Serrulata* [subsect.] *Evoluta* Presl, Hymen. 32. 1843. Lectotype: *H. tunbridgense* L.

Hymenophyllum subg. *Euhymenophyllum* [sect.] *Serrulata* [subsect.] *Dimidiata* Presl, Hymen. 32. 1843. Lectotype: *H. unilaterale* Bory.

The section *Hymenophyllum* contains according to Copeland the following presumed species: *H. alveolatum* C. Chr., *H. antarcticum* Presl, *H. asperulum* Kunze, *H. barbatum* Baker, *H. brachypus* Sodiro, *H. ceratophylloides* Christ?, *H. cupressiforme* Labill., *H. dentatum* Cav., *H. falklandicum* Baker, *H. gracilescens* Domin, *H. herzogii* Rosenst., *H. moorei* Baker, *H. nahuelhuapiense* Diem & Lichtenstein, *H. nanum* Sodiro, *H. peltatum* (Poir.) Desv. (incl. presumably *H. wilsonii* Hook.), *H. perfissum* Copel., *H. pumilum* C. Moore, *H. revolutum* Colenso, *H. rugosum* C. Chr. & Skottsb., *H. secundum* Hook. & Grev., *H. simonsianum* Hook., *H. spicatum* Christ, *H. torquescens* v.d. Bosch, *H. tunbridgense* (L.) J. E. Smith, and *H. uncinatum* Sim.

Hymenophyllum sect. **2. Buesia** (Morton) Morton, comb. nov.

Hymenophyllum subg. *Buesia* Morton, Bot. Gaz. 93: 336. 1932. Type: *Hymenophyllum mirificum* Morton.

Buesia (Morton) Copel. Phil. Journ. Sci. 67: 47. 1938.

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[11] Phil. Journ. Sci. 64: 77. 1937.

When I described this as a subgenus back in 1932 I really knew very little about the Hymenophyllaceae in general. The type species, *H. mirificum*, was so strange that it seemed to be subgenerically distinguishable from *Meringium* (or *Leptocionium*, as it was called at that time). The species is peculiar and still known only from the original material, but relatives are now known that are less distinctive. I am now uncertain that it even needs to be distinguished as a section, but it can perhaps separate a small group of species characterized by having some accessory wings not in the plane of the frond. The subglobose receptacle found in the type species is not uniformly present in others. The additional species referred here are: *H. cristatum* Hook. & Grev., *H. jamesonii* Hook., *H. **megistocarpum*** (Copel.) Morton, comb. nov. (*Buesia megistocarpa* Copel. Univ. Calif. Publ. Bot. 19: 295: 1941), *H. sodiroi* C. Chr., and possibly one or two additional undescribed ones.

Hymenophyllum sect. **3. Ptychophyllum** (Presl) C. Chr. Ind. Fil. XVI. 1906.

Didymoglossum subg. *Chilodium* Presl, Hymen. 23. 1843. Lectotype: *Trichomanes neesii* Blume. The subgenus originally consisted of two unrelated species, *T. neesii* Blume and *Didymoglossum longisetum* Presl; the first is a *Hymenophyllum* and the second a *Trichomanes* of the section *Pachychaetum*. The first to typify the group was Christensen in the "Index Filicum" (p. XVI), who chose the *Hymenophyllum* element, citing as type *H. denticulatum* Swartz, which he considered the correct name, taxonomically, for *Trichomanes neesii* Blume. This fixes the lectotype as *T. neesii*.

Meringium Presl, Hymen. 24, *pl. 8. f. B*. 1843. Type: *Meringium meyenianum* Presl = *Hymenophyllum meyenianum* (Presl) Copel. There were two original species, but the second, *M. blumeanum* (Spreng.) Presl, was referred to the genus only with a query, and so *M. meyenianum* is unquestionably the type.

Myrmecostylum Presl, Hymen. 27, *pl. 10, f. A*. 1843. Lectotype: *Myrmecostylum tortuosum* (Hook. & Grev.) Presl = *Hymenophyllum tortuosum* Hook. & Grev. (chosen by C. Chr. Ind. Fil. XVI. 1906). There were two other original species, *M. dichotomum* (Cav.) Presl and *M. clavatum* (Swartz) Presl; the former was referred to the genus only with a query and the latter disagrees with the description, so Christensen's choice was the only possible one.

Ptychophyllum Presl, Hymen. 28, *pl. 11, f. E*. 1843. Type: *Ptychophyllum plicatum* (Kaulf.) Presl = *Hymenophyllum plicatum* Kaulf., the only original species. In the "Index Filicum" (p. XVI. 1906) Christensen indicated the type as *H. dichotomum* Cav., but this is an obvious error, since it was not one of the original species.

Tetralasma Philippi, Linnaea 30: 208. 1860. An invalidly published provisional name, proposed in case the character of a 4-parted indusium should prove of generic significance. Copeland indicated (Phil. Journ. Sci. 67: 45. 1938) that this indusial character is probably teratological. Based on *Hymenophyllum quadrifidum* Philippi, considered by Diem & Lichtenstein [12] as a synonym of *Hymenophyllum plicatum* Kaulf.

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[12] Darwiniana 11: 675. 1959.

Hymenophyllum subg. *Leptocionium* sect. *Chilodium* (Presl) C. Clr. Ind. Fil. XVI. 1906.

Hymenophyllum subg. *Leptocionium* sect. *Myrmecostylum* (Presl) C. Chr. Ind. Fil. XVI. 1906.

Hymenophyllum sect. *Acanthotheca* Nakai, Bot. Mag. Tokyo 40: 242. 1926. Type: *Didymoglossum acanthoides* v. d. Bosch=*Hymenophyllum acanthoides* (v. d. Bosch) Rosenst.

Hymenophyllum subg. *Meringium* (Presl) Copel. Phil. Journ. Sci. 64: 14. 1937. Illegitimate, because superfluous, the earlier subgeneric name *Chilodium* Presl being available for the same concept.

Hymenophyllum sect. *Meringium* (Presl) Diem & Lichtenstein, Darwiniana 11: 666. 1959. Illegitimate, because superfluous, the earlier sectional names *Chilodium*, *Ptychophyllum*, *Myrmecostylum*, and *Acanthotheca* all being legitimate and available.

As a generic name, *Meringium* Presl would be correct for this group, although Copeland might better have chosen *Ptychophyllum* or *Myrmecostylum*, both of the same date as *Meringium*, better described, and based on better known species. However, as a subgenus or as a section *Meringium* may not be used, since an earlier subgeneric name (*Chilodium*, which has not however been transferred to *Hymenophyllum* as a subgenus) is available, and several sectional names (*Chilodium*, *Ptychophyllum*, *Myrmecostylum*, and *Acanthotheca*) are earlier than *Meringium* and available. I choose *Ptychophyllum*, which is clearcut in its application. The competing sectional names, sect. *Chilodium* (Presl) C. Chr. and sect. *Myrmecostylum* (Presl) C. Chr. are of the same date (1906) as sect. *Ptychophyllum* (Presl) C. Chr., and no one has previously made a choice between them.

Copeland included within *Meringium* four species that were said to be anomalous in having entire-margined segments. [13] *Hymenophyllum edentulum* (v. d. Bosch) C. Chr. is not really "edentate" but has obvious although sparse teeth, and *H. holochilum* (v. d. Bosch) C. Chr. has obviously toothed segements typical of *Ptychophyllum*. The other two species *H. macroglossum* v. d. Bosch and *H. pachydermicum* Cesati really do have entire segments; they were placed in *Meringium* on presumed affinities, but these were not demonstrated, and in fact absolutely nothing is known regarding their phylogeny or real relationships. They could have arisen as hybrids between two sections or they could be the result of parallel or convergent evolution. However, they probably can be accommodated in subg. *Sphaerocionium* subsect. *Ciliata* without undue strain. In this way it is possible to define *Ptychophyllum* more accurately, even if conceivably more artificially.

Aside from the common *Hymenophyllum fucoides* (Swartz) Swartz, which may be an aggregate species as currently recognized, the American species of sect. *Ptychophyllum* are little known; they include

[13] Phil. Journ. Sci. 67: 40. 1938.

H. calodictyon v. d. Bosch, *H. durandii* Christ, *H. ectocarpon* Fée, and *H. peruvianum* Hook. & Grev. The following four species of southern South America have been carefully studied and accurately defined in a recent study by Diem and Lichtenstein: *H. krauseanum* Philippi, *H. magellanicum* (Klotzsch) Willd. ex Kunze, *H. plicatum* Kaulf., and *H. tortuosum* Hook. & Grev.

The Old World species are much more numerous; they include: *H. acanthoides* (v. d. Bosch) Rosenst., *H. affine* Brack., *H.* ***archboldii*** (Copel.) Morton, comb. nov. (*Meringium archboldii* Copel. Phil. Journ. Sci. 73: 462, *fig. 3*. 1941), *H. bakeri* Copel., *H.* ***bartlettii*** (Copel.) Morton, comb. nov. (*Meringium bartlettii* Copel. Phil. Journ. Sci. 73: 464. 1941), *H. batuense* Rosenst., *H. bicolanum* Copel., *H. bivalve* Copel., *H. blandum* Raciborski, *H. bontocense* Copel., *H. brachyglossum* A. Braun, *H. brevidens* van Alderw. van Rosenb., *H. bryophilum* C. Chr., *H. campanulatum* Christ, *H. carduncului* C. Chr., *H. cincinnatum* Gepp, *H. denticulatum* Swartz, *H. dimidiatum* Mett., *H. edentulum* (v. d. Bosch) C. Chr., *H. elbertii* Rosenst., *H. ellipticosorum* van Alderw. van Rosenb., *H. feejeense* Brack., *H. firmum* van Alderw. van Rosenb., *H. foersteri* Rosenst., *H. gorgoneum* Copel., *H. hallieri* Rosenst., *H. hieronymii* C. Chr., *H. holochilum* (v. d. Bosch) C. Chr., *H. hosei* Copel., *H. howense* Brownlie, *H. johorense* Holttum, *H. kerianum* Watts, *H. klabatense* Christ, *H.* ***latifolium*** (Copel.) Morton, comb. nov. (*Meringium latifolium* Copel. Phil. Journ. Sci. 73: 461. 1941), *H.* ***laxum*** (Copel.) Morton, comb. nov. (*Meringium laxum* Copel. Univ. Calif. Publ. Bot. 18: 217. 1942), *H. lobbii* Moore, *H. macrosorum* van Alderw. van Rosenb., *H.* ***melanosorum*** (Copel.) Morton, comb. nov. (*Meringium melanosorum* Copel. Phil. Journ. Sci. 73: 462. 1941), *H. merrillii* Christ, *H. meyenianum* (Presl) Copel., *H. minimum* A. Rich., *H. multifidum* (Forst.) Swartz, *H. nutantifolium* van Alderw. van Rosenb., *H. ovatum* Copel., *H. penangianum* Matthew & Christ, *H. pedicullariifolium* Cesati, *H. piliferum* C. Chr., *H. perparvulum* van Alderw. van Rosenb., *H. poilanei* Tardieu, *H. pollenianum* Rosenst., *H. praetervisum* Christ, *H. pseudotunbridgense* Watts, *H. pulchrum* Copel., *H. pumilio* Rosenst., *H. ramosii* Copel., *H. reductum* Copel., *H. reinwardtii* v. d. Bosch, *H. ricciifolium* Bory, *H. rosenstockii* Brause, *H. rubellum* Rosenst., *H. rufifolium* van Alderw. van Rosenb., *H. rufifrons* van Alderw. van Rosenb., *H. samoense* Baker, *H. subdimidiatum* Rosenst., *H.* ***taiwanense*** (Tagawa) Morton, comb. nov. (*Mecodium taiwanense* Tagawa, Acta Phytotax. Geobot. 9: 141. 1940), *H. tenellum* Kuhn. *H. thuidium* Harrington, *H. torricellianum* van Alderw. van Rosenb., *H. triangulare* Baker, and *H. vittatum* Copel.

Hymenophyllum sect. **4. Eupectinum** Diem & Lichtenstein

Hymenophyllum sect. *Eupectinum* Diem & Lichtenstein, Darwiniana 11: 635. 1959.

TYPE: *Hymenophyllum pectinatum* Cav.

This small group of South American species, distinguished by having one-sided pinnae, contains only *H. pectinatum*, *H. quetrihuense* Diem & Lichtenstein, and *H. umbratile* Diem & Lichtenstein.

Hymenophyllum sect. **5. Myriodon** (Copel.) Morton, comb. nov.

Hymenophyllum subg. *Myriodon* Copel. Phil. Journ. Sci. 64: 73. 1937.

Type: *Hymenophyllum odontophyllum* Copel.

Myriodon (Copel.) Copel. Phil. Journ. Sci. 67: 47. 1938.

A small aberrant group of New Guinea, perhaps monotypic, containing *H. brassii* C. Chr., of which *H. odontophyllum* Copel. may be a variant.

Subg. 2. *Sphaerocionium*

Hymenophyllum subg. **2. Sphaerocionium** (Presl) C. Chr.

Sphaerocionium Presl, Hymen. 33, *pl. 4, f. B, pl. 10, f. B, C.* 1843. Lectotype: *Sphaerocionium hirsutum* (L.) Presl = *Hymenophyllum hirsutum* (L.) Swartz, chosen by Copeland, Phil. Journ. Sci. 64: 10. 1937. A large number of species were referred to the genus originally. Copeland chose the first named, a suitable choice for maintaining the application of the name in its current sense. Christensen had refused to indicate a type in the "Index Filicum."

Hymenophyllum subg. *Euhymenophyllum* [sect.] *Pilosa* Presl, Hymen. 32. 1843. Lectotype: *Hymenophyllum valvatum* Hook. & Grev. Presl used the sectional name "*Pilosa*" twice, once in *Hymenophyllum* and once in his genus *Sphaerocionium*, both for essentially the same kind of plant. The first species cited, *H. valvatum*, agrees with the diagnosis better than the second, *H. blepharodes* Presl.

Sphaerocionium sect. *Pilosa* Presl, Hymen. 34. 1843. Lectotype: *Sphaerocionium schiedeanum* Presl = *Hymenophyllum crispum* H. B. K. (ex char.). Presl distinguished his section by the simple rather than stellate marginal hairs. No lectotype has been designated previously.

Hymenophyllum subg. *Charitophyllum* v. d. Bosch, *in* Junghuhn, Plant. Junghuhn. 562. 1856, nom. nud. Based on *Hymenophyllum lineare* Swartz.

Hymenophyllum subg. *Euhymenophyllum* sect. *Sphaerocionium* (Presl) C. Chr. Ind. Fil. XV. 1906.

Hymenophyllum subg. *Sphaerocionium* (Presl) C. Chr. Ind. Fil. Suppl. 3: 5. 1934.

This subgenus is divisible into two sections, *Sphaerocionium* and *Apteropteris*.

Hymenophyllum sect. **6. Sphaerocionium**

The section *Sphaerocionium* is divisible into four subsections, as follows:

Hymenophyllum sect. **Spaerocionium** subsect. **Ciliata** Prantl

Hymenophyllum subsect. *Ciliata* Prantl, Untersuch. Morph. Gefässkrypt. 1: 55. 1875. Lectotype: *Hymenophyllum lineare* Swartz, the first species mentioned by Prantl and which agrees with the characterization. This

group contains the species that are hairy on the margins or veins only and not on the surfaces.

Hymenophyllum sect. *Sphaerocionium* subsect. *Ciliata* Morton, Contr. U.S. Nat. Herb. 29: 144. 1947. Invalidly proposed without Latin diagnosis. No type indicated, but assumed to be *H. ciliatum* (Swartz) Swartz.

The subsection *Ciliata* includes the following American species: *Hymenophyllum adiantoides* v. d. Bosch, *H. caparavense* Brade, *H. consanguineum* Morton, *H. crispum* H. B. K., *H. delicatulum* Sehnem, *H. dimorphum* Christ, *H. elegans* Spreng., *H. glaziovii* Baker, *H. hirsutum* (L.) Swartz (incl. *H. ciliatum* Swartz), *H. hirtellum* Swartz, *H. lineare* (Swartz) Swartz, *H. maxonii* Christ ex Morton, *H. microcarpum* Desv., *H. molle* Morton, *H. prionema* Kunze, *H. pulchellum* Schlecht. & Cham., *H. roraimense* Morton, *H. ruizianum* (Klotzsch) Kunze, *H. sampaioanum* Brade & Rosenst., *H. semiglabrum* Rosenst., *H. silvaticum* Morton, *H. silveirae* Christ, *H. subrigidum* Christ, *H. tenerrimum* v. d. Bosch, *H. trapezoidale* Liebm., *H. trichophyllum* H. B. K., *H. urbanii* Brause, and *H. valvatum* Hook. & Grev. Among the Old World species are: *H. aeruginosum* (Poir.) Carm., *H. capillare* Desv., *H. hygrometricum* (Poir.) Desv., *H. ivohibense* Tardieu, *H. lanceolatum* Hook. & Arn., *H. macroglossum* v. d. Bosch, *H. marlothii* Brause, *H. obtusum* Hook & Arn., *H. pachydermicum* Cesati, *H. poolii* Baker, *H. subobtusum* Rosenst., and *H. viguieri* Tardieu.

Hymenophyllum sect. **Sphaerocionium** subsect. **Plumosa** Prantl

Dermatophlebium Presl, Epim. Bot. 17, 258. 1849 [1851], nom. nud.

Hymenophyllum [subsect.] *Plumosa* Prantl, Untersuch. Morph. Gefässkrypt. 1: 55. 1875. Lectotype: *Hymenophyllum plumosum* Kaulf.

Hymenophyllum sect. *Dermatophlebium* C. Chr. Ind. Fil. XV. 1906, nom. nud.

In the "Index Filicum," Christensen indicated the type of the unpublished section *Dermatophlebium* as *H. sericeum* (Swartz) Swartz, which does belong in this group, but was not the original species listed by Presl. Copeland [14] indicated several species as belonging to a group *Dermatophlebium*, but without a Latin diagnosis or any indication of the rank of the group intended. In my revision of the American species of *Sphaerocionium* I did not assign any special rank to this group of species (my nos. 45–52), *H. sericeum* (Swartz) Swartz, *H. horizontale* Morton, *H. lobato-alatum* Klotzsch, *H. pyramidatum* Desv., *H. plumosum* Kaulf., *H. multialatum* Morton, and *H. tomentosum* Kunze, of which a synonym is *H. fusugasugense* Karst. (taken up as a correct name in my revision), but they do deserve some nomenclatural distinction.

Hymenophyllum sect. **Sphaerocionium** subsect. **Hirsuta** Prantl

Sphaerocionium sect. *Stellata* Presl, Hymen. 34. 1843. Lectotype: *Hymenophyllum interruptum* Kunze.

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[14] Phil. Journ. Sci. 67: 30. 1938.

Hymenophyllum sect. *Pilosa* Prantl, Untersuch. Morph. Gefässkrypt. 1: 55. 1875. Lectotype: *Hymenophyllum raddianum* C. Muell.

Hymenophyllum [subsect.] *Hirsuta* Prantl, Untersuch. Morph. Gefässkrypt. 1: 55. 1875. Lectotype: *Hymenophyllum raddianum* C. Muell. Prantl listed also *H. hirsutum* (L.) Swartz, but since this species was misinterpreted and does not agree with the characterization, *H. raddianum* must be the lectotype. This species is a synonym of *H. fragile* (Hedw.) Morton.

Hymenophyllum sect. *Sphaerocionium* subsect. *Lanata* Morton, Contr. U.S. Nat. Herb. 29: 144. 1947. Invalidly published without a Latin diagnosis. No type was indicated, but *H. lanatum* Fée assumed typical.

The American species of subsect. *Hirsuta* are: *Hymenophyllum amabile* Morton, *H. angustum* v. d. Bosch, *H. antillense* (Jenm.) Jenm., *H. dependens* Morton, *H. elegantulum* v. d. Bosch, *H. ferrugineum* Colla, *H. fragile* (Hedw.) Morton, *H. hemipteron* Rosenst., *H. interruptum* Kunze, *H. karstenianum* Sturm, *H. lanatum* Fée, *H. latifrons* v. d. Bosch, *H. lindenii* Hook., *H. plumieri* Hook. & Grev., *H. rufum* Fée, *H. sieberi* (Presl) v. d. Bosch, *H. simplex* Morton, *H. speciosum* v. d. Bosch, and *H. superbum* Morton. The only Old World species are perhaps *H. pilosissimum* C. Chr., and *H. splendidum* van den Bosch.

Hymenophyllum sect. **Sphaerocionium** subsect. **Leptocionium** (Presl) Morton, comb. nov.

Leptocionium Presl, Hymen. 26, *pl. 11, f. D.* 1843: Type: *Leptocionium dicranotrichum* Presl. A second species was referred to the genus, *L. fucoides* (Swartz) Presl, but since this was indicated only with a query it may not be considered the type.

Hymenophyllum sect. *Leptocionium* (Presl) Prantl, Untersuch. Morph. Gefässkrypt. 1: 54. 1875 (as to type, not concept).

Hymenophyllum subg. *Leptocionium* (Presl) Christ, Farnkr. Erde 20. 1897.

This subsection includes only the southern South American *H. dicranotrichum*. Christensen misunderstood it and misapplied the name *Leptocionium* as a subgenus to include all the species of subg. *Hymenophyllum* and "*Meringium*" in the "Index Filicum," Supplement III.

Hymenophyllum sect. **7. Apteropteris** (Copel.) Morton, comb. nov.

Hymenophyllum subg. *Apteropteris* Copel. Phil. Journ. Sci. 64: 176. 1937. Type: *Hymenophyllum malingii* (Hook.) Mett.

Apteropteris (Copel.) Copel. Phil. Journ. Sci. 67: 34. 1938.

The single species of this group, *H. malingii*, is so peculiar in its vegetative structure that it can perhaps be regarded as representing a monotypic section. The structure was well described by Holloway.[15]

Subg. 3. *Craspedophyllum*

Hymenophyllum subg. **Craspedophyllum** Presl

Hymenophyllum subg. *Craspedophyllum* Presl, Hymen. 33. 1843. Type: *Hymenophyllum marginatum* Hook. & Grev.

[15] Trans. New Zeal. Inst. 54: 596, *pls. 66, 76*. 1923.

Pachyloma v. d. Bosch, Versl. Meded. Konink. Akad. Wetens. Afd. Natuurk. 11: 318. 1861, non DC., 1828. Type: *Hymenophyllum marginatum* Hook. & Grev.
Hymenophyllum sect. *Pachyloma* (v. d. Bosch) Christ, Farnkr. Erde 15. 1897.
Hymenophyllum sect. *Craspedophyllum* (Presl) C. Chr. Ind. Fil. XV. 1906.
Craspedophyllum (Presl) Copel. Phil. Journ. Sci. 67: 27. 1938.

Hymenophyllum sect. 8. Craspedophyllum

Only two species are in this subgenus, *H. marginatum* Hook. & Grev., of Australia and Tasmania, and *H. armstrongii* Baker, of New Zealand.

Subg. 4. *Hemicyatheon*

Hymenophyllum subg. **Hemicyatheon** Domin
Hymenophyllum subg. *Hemicyatheon* Domin, Bibl. Bot. 20, Heft. 85. 20. 1913. Lectotype: *Hymenophyllum baileyanum* Domin, chosen by Christensen, Ind. Fil. Suppl. 3: 5. 1934.
Hemicyatheon (Domin) Copel. Phil. Journ. Sci. 67: 27. 1938.

Hymenophyllum sect. 9. Hemicyatheon

I do not feel confident that this entity deserves subgeneric rank. Copeland's reasons for maintaining it are: "Unless the group be recognized as such, either its two members must be widely separated contrary to nature, or it must be included in *Meringium* where *H. baileyanum* would be very much out of place, or in *Mecodium*, where *H. deplanchei* would be altogether misplaced. I have already shown that the occurrence of such a group as this is explicable by assuming hybridization between members of the two great groups the characters of which are here combined." Copeland's argument will hold only if it is true that *H. baileyanum* and *H. deplanchei*, the first with entire margins and the second with toothed margins, are really more closely allied to each other than to any other species, but this has not actually been demonstrated. It could be that they do really belong to different subgenera and are similar by reason of convergent evolution rather than by reason of a common origin, which is by no means impossible on a priori grounds. No doubt *H. baileyanum*, the type of *Hemicyatheon*, is very close to *Mecodium*, and frankly the only reason that I don't actually refer it to that subgenus is that as a subgenus *Hemicyatheon* has priority, and thus the great group of species known as *Mecodium* would all have to become *Hemicyatheon*, an argument that could be defended more on the grounds of practicality than theory. For the present I refer *H. deplanchei* to subg. *Hymenophyllum*.

Subg. 5. *Mecodium*

Hymenophyllum subg. **Mecodium** Copel.
Mecodium Presl, Epim. Bot. 258. 1849 [1851], nom. nud.

Hymenophyllum subg. *Euhymenophyllum* sect. *Integra* Presl, Hymen. 32. 1843. Lectotype: *Trichomanes asplenioides* Swartz=*Hymenophyllum asplenioides* (Swartz) Swartz. Presl described essentially the same group of species twice, once under *Hymenophyllum* as sect. *Integra*, and once under his genus *Sphaerocionium* as sect. *Glabra*.

Sphaerocionium sect. *Glabra* Presl, Hymen. 34. 1843. Lectotype: *Hymenophyllum caudiculatum* Mart.

Hymenophyllum subg. *Euphorophyllum* v. d. Bosch *in* Junghuhn, Plant. Junghuhn. 563. 1856, nom. nud. Based on *Hymenophyllum polyanthos* (Swartz) Swartz.

Hymenophyllum subg. *Hapalophyllum* v. d. Bosch, *in* Junghuhn, Plant. Junghuhn. 566. 1856, nom. nud. Based on *Hymenophyllum javanicum* Spreng.

Hymenophyllum sect. *Glabra* Prantl, Untersuch. Morph. Gefässkrypt. 1: 54. 1875. Lectotype: *Hymenophyllum polyanthos* (Swartz) Swartz.

Hymenophyllum sect. *Globosa* Prantl, Untersuch. Morph Gefässkrypt. 1: 55. 1875. Lectotype: *Hymenophyllum junghuhnii* v. d. Bosch. A group distinguished by having the tip of the receptacle enlarged. Its significance is unknown, but eventually it might turn out to be of sectional importance.

Hymenophyllum subg. *Euhymenophyllum* sect. *Mecodium* C. Chr. Ind. Fil. XV. 1906, nom. nud.

Hymenophyllum subg. *Mecodium* Copel. Phil. Journ. Sci. 64: 93. 1937.

Mecodium (Copel.) Copel. Phil. Journ. Sci. 67: 17. 1938.

Hymenophyllum sect. *Mecodium* (Copel.) Diem & Lichtenstein, Darwiniana 11: 637. 1959.

LECTOTYPE: *Hymenophyllum polyanthos* (Swartz) Swartz, selected by Copeland, Phil. Journ. Sci. 64: 10. 1937. Later, Copeland (Phil. Journ. Sci. 67: 14. 1938) stated the type to be *H. sanguinolentum* Forst., which would have been the most logical original choice, since it was the species that Presl mentioned in proposing *Mecodium* as a nomen nudum, but nevertheless, Copeland's first choice may not be rejected.

Hymenophyllum sect. 10. Mecodium (Copel.) Diem & Lichtenstein.

Divisible into the three subsections:

Hymenophyllum sect. Mecodium subsect. Mecodium

Copeland (Phil. Journ. Sci. 67: 19. 1938) included within *Mecodium* three species (*H. reinwardtii* v. d. Bosch, *H. thuidium* Harrington, and *H. samoense* Baker) with toothed-margined segments. This destroys the unity of the group and is really unnecessary, since it was done on a priori assumptions regarding the relationships of these species, concerning which nothing is really known. As mentioned previously in discussing the inclusion by Copeland of two entire-margined species in *Meringium*, the origin of these few aberrant species ought not to be allowed to confuse the classification. It is possible that they represent ancient (or recent) hybrids or are the result of a kind of convergent evolution. Therefore I do not find it unnatural to in-

clude the three species mentioned above in "*Meringium*." In this way a reasonable and workable classification can be produced and these aberrant species placed where they fit best so far as our present knowledge goes, leaving the question of their ultimate relationships to be decided later by detailed anatomical, morphological, and cytological evidence. Copeland had no such evidence, only intuition.

The subsect. *Mecodium* is the largest group of the genus, at least so far as accepted names is concerned. It is also the most difficult group, for lacking characters of toothing and pubescence many of the species look quite alike, and many really are perhaps only variations of the common and worldwide *H. polyanthos*. They include: *Hymenophyllum abruptum* Hook., *H. alfredii* Ros., *H. andinum* v. d. B., *H. angulosum* Chr., *H. apiculatum* Mett., *H. asplenioides* Sw., *H. atrovirens* Col., *H. axillare* Sw., *H. badium* Hook, & Grev., *H. balansae* Fourn., *H. bamlerianum* Rosenst., *H. bismarckianum* Christ, *H. botryoides* v. d. Bosch, *H. breve* Rosenst., *H. brevistipes* Liebm., *H. carnosum* Christ, *H. caudiculatum* Mart., *H. constrictum* Christ, *H. contextum* Rosenst., *H.* ***contiguum*** (D. A. Smith) Morton, comb. nov. (*Mecodium contiguum* D. A. Smith, N. Queensl. Nat. 14: 4, *f. 1.* 1946), *H. contortum* v. d. Bosch, H. ***copelandii*** Morton, nom. nov. (*Mecodium archboldii* Copel. Phil. Journ. Sci. 73:458. 1941, non *H. archboldii* (Copel.) Morton, a species of sect. *Ptychophyllum*), *H. corrugatum* Christ, *H. costaricanum* v. d. Bosch, *H. crispato-alatum* Hayata, *H. crispatum* Wall., *H. cuneatum* Kunze, *H. darwinii* Hook. f., *H. dendritis* Rosenst., *H.* ***diversilabium*** (Copel.) Morton, comb. nov. (*Mecodium diversilabium* Copel. Occas. Pap. Bern. Bish. Mus. 14: 49, *pl. 2.* 1938), *H.* ***edanoi*** (Copel.) Morton, comb. nov. (*Mecodium edanoi* Copel. Phil. Journ. Sci. 81: 2. 1952), *H. emarginatum* Swartz, *H. endiviifolium* Desv., *H. exsertum* Wall., *H. farallonense* Hieron., *H. fecundum* v. d. Bosch, *H. fendlerianum* Sturm, *H. ferax* v. d. Bosch, *H. fimbriatum* J. Smith, *H. flabellatum* Labill., *H. flexile* Makino, *H. flexuosum* A. Cunn., *H. fumarioides* Willd., *H. funckii* v. d. Bosch, *H. gardneri* v. d. Bosch, *H. gollmeri* v. d. Bosch, *H. heimii* Tardieu (of Madagascar, one of the most peculiar species, with a simple blade with pinnate veins and a deeply pinnatilobate margin), *H. helicoideum* Sod., *H. humbertii* C. Chr., *H. imbricatum* Blume, *H. inaequale* Desv., *H. intricatum* v. d. Bosch, *H. involucratum* Copel., *H. javanicum* Spreng., *H. junghuhnii* v. d. Bosch, *H. kuhnii* C. Chr., *H. laciniosum* Christ, *H. lehmannii* Hieron., *H. leratii* Rosenst., *H. levingii* C. B. Clarke, *H. longifolium* van Alderw. van Rosenb., *H. macrothecum* Fée, *H.* ***mexiae*** (Copel.) Morton, comb. nov. (*Mecodium mexiae* Copel. Univ. Calif. Publ. Bot. 19: 294, *pl. 48.* 1941), *H. micans* Christ, *H. microphyllum* Mett., *H. microsorum* v. d. Bosch, *H. mnioides* Baker, *H. montanum* Kirk, *H. myriocarpum* Hook., *H. nigrescens* Liebm., *H.*

nitiduloides Copel., *H. oligosorum* Makino, *H. ooides* Muell. & Bak., *H. opacum* Copel., *H. osmundoides* v. d. Bosch, *H. paniculiflorum* Presl, *H. parvulum* C. Chr., *H. paucicarpum* Jenm., *H. polyanthos* (Swartz) Swartz, *H. productoides* J. W. Moore, *H. productum* Kunze, *H. protrusum* Hook., *H. pulcherrimum* Col., *H. rarum* R. Brown, *H. recurvum* Gaud., *H. remotipinna* Bonap., *H. reniforme* Hook., *H. retusilobum* Hayata, *H. rimbachii* Sod., *H. riukiuense* Christ, *H. rufescens* Kirk, *H. salakense* Racib., *H. sanguinolentum* Swartz, *H. siliquosum* Christ, *H. skottsbergii* C. Chr., *H. streptophyllum* Fourn., *H. tablaziense* Christ, *H. tenerum* v. d. Bosch, *H. todjambuense* Kjellb., *H. treubii* Racib., *H. trianae* Hieron., *H. trichomanoides* v. d. Bosch, *H. undulatum* Swartz, *H. veronicoides* C. Chr., *H. walleri* Maiden & Betche, *H. whitei* Goy, and *H. wrightii* v. d. Bosch.

Hymenophyllum sect. **Mecodium** subsect. **Amphipterum** (Copel.) Morton, comb. nov.

Amphipterum Presl, Epim. Bot. 258. 1849 [1851], nom. nud.

Hymenophyllum sect. *Amphipterum* C. Chr. Ind. Fil. XV. 1906, nom. nud. Based on *Amphipterum* Presl.

Hymenophyllum subg. *Amphipterum* Copel. Phil. Journ. Sci. 64: 68. 1937. Type: *Trichomanes fuscum* Blume=*Hymenophyllum fuscum* (Blume) v. d. Bosch.

Amphipterum (Copel.) Copel. Phil. Journ. Sci. 67: 14. 1938.

This small group perhaps contains only *Hymenophyllum fuscum* and *H. ledermannii* Brause. The other two species referred here by Copeland, *H. geluense* Rosenst. and *H. laminatum* Copel., are probably referable to subg. *Hymenophyllum* on the basis of their toothed segments. The sect. *Amphipterum* is hardly worth recognizing, except perhaps for consistency, since it differs only in the presence of accessory wings not in the plane of the frond. Since I assign names to such groups in the subgenera *Hymenophyllum* and *Sphaerocionium*, a similar group can be distinguished here although it is perhaps not really necessary. I do not undertake to place *Amphipterum humatoides* Copel., which is unknown to me.

Hymenophyllum sect. **Mecodium** subsect. **Diplophyllum** (v. d. Bosch) Morton, comb. nov.

Hymenophyllum subg. *Platynophyllum* v. d. Bosch, *in* Junghuhn, Plant. Junghuhn. 569. 1856, nom. nud. Based on *Hymenophyllum dilatatum* (Forst.) Swartz.

Diplophyllum v. d. Bosch, Versl. Meded. Konink. Akad. Wetens. Afd. Natuurk. 11: 322. 1861, non *Diplophyllum* Lehm., 1814. Lectotype: *Trichomanes dilatatum* Forst.=*Hymenophyllum dilatatum* (Forst.) Swartz, chosen by C. Chr. Ind. Fil. XV. 1906 (as "Diploophyllum").

Hymenophyllum sect. *Diplophyllum* (v. d. Bosch) C. Chr. Ind. Fil. XV. 1906.

Hymenophyllum dilatatum and the related *H. scabrum* A. Richard, of New Zealand, are peculiar among the species of *Hymenophyllum*

in having the fronds three cells, rather than one cell, thick. This would seem to be a fundamental and important difference, but two other species, *H. australe* Willd. and *H. demissum* (Forst.) Swartz, are said to be sometimes partly two cells thick, and these would therefore perhaps go into the subsect. *Diplophyllum* technically. The matter needs to be investigated further.

V. *Cardiomanes*

Cardiomanes Presl, Hymen. 12. 1843.

Trichomanes subg. *Cardiomanes* (Presl) Christ, Farnkr. Erde 33. 1897 (erroneously attributed to Presl).

Trichomanes sect. *Eutrichomanes* [subsect.] *Cardiomanes* (Presl) van Alderw. van Rosenb. Malay. Ferns 83. 1908.

TYPE: *Trichomanes reniforme* Forst.=*Cardiomanes reniforme* (Forst.) Presl.

This peculiar plant, endemic in New Zealand, has always excited interest by its strange shape for a member of the filmy-fern family. In its indusial structure it is typical of *Trichomanes*, and the pantotactic sori are, of course, correlated with the simple blade with forked veins. The only character that might really be distinctive is that the blades are four cells in thickness, and this too doubtless is correlated with the blade shape. A blade of this size would be almost too delicate and flaccid if it were only one cell thick, although this is not necessarily the case, for in the comparable Chilean *Hymenoglossum* an equally large blade is still only one cell thick except at the very margin. Still, for convenience and because its near affinities are unknown, *Cardiomanes* can be recognized as a monotypic genus, as has been the tendency by those who otherwise do not favor splitting up the large genus *Trichomanes*.

VI. *Trichomanes*

Trichomanes L. Sp. Pl. 1097. 1753.

TYPE: There has been some uncertainty as to the correct lectotype for *Trichomanes* L. The 11 original species, arranged as was usual in the time of Linnaeus in the order of division of the frond, with the simplest first were: *T. membranaceum*, *T. crispum*, *T. polypodioides*, *T. hirsutum*, *T. pyxidiferum*, *T. tunbridgense*, *T. adiantoides*, *T. scandens*, *T. chinense*, *T. canariense*, and *T. capillaceum*. Obviously Linnaeus did not really understand *Trichomanes* because he included several species with somewhat similar involucres but which do not belong to the family Hymenophyllaceae. The first species removed were: *adiantoides*, an *Asplenium; chinense*, *Adiantum chinense* (L.) Burm.; [16] and *canariense*, *Davallia canariensis* (L.) J. E.

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[16] Now *Sphenomeris chinensis* (L.) Maxon.

Smith. J. E. Smith also removed *tunbridgense* as the type of *Hymenophyllum*, and Swartz later transferred *hirsutum* to *Hymenophyllum*. The remaining species have all been left in *Trichomanes*, except by Copeland, and I consider them congeneric. Christensen in the "Index Filicum" (XV. 1906) did not indicate the type of his subg. *Eutrichomanes*, but his concept is shown by the species he included, namely only *T. pyxidiferum*, *scandens*, and *capillaceum*. In this he was following the practice of previous specialists like Presl, van den Bosch, and Prantl.

Copeland upset this concept completely in his "Genera Hymenophyllacearum" (1938) and "Genera Filicum" (1947) by coining the new name *Vandenboschia* and calling *Trichomanes* what had been termed subg. *Achomanes* or subg. *Ptilophyllum*, typified by *T. crispum* L. Because of his prestige Copeland has been followed in his typification by most subsequent workers without a critical evaluation of his reasoning. However, in this case as in many others, Copeland's typifications are not to be trusted since they were made on a highly personal basis not in accord with the rules of the International Code of Botanical Nomenclature or with practices currently accepted in Copeland's own time.

Copeland's reasoning was given in the "Genera Hymenophyllacearum" (pp. 68, 69), as follows:

> Although the era of our botanic nomenclature began with the publication of Linnaeus's Species Plantarum in 1753, genera are not defined in that work. For Linnaean generic definitions and, therefore, for the typification of his genera, we must go to earlier works of the same author. [17] In the case of *Trichomanes* it is defined in the Corollarium Genera Plantarum (and, teste Underwood, in Hortus Cliffortianus, also dated 1737): "Calyx turbinatus, solitarius, erectus, ex ipso margine follii. Stylus setaceus capsulam terminans." No species is mentioned, but reference is made to Plumier [18] for an illustration. This is *Trichomanes crispum*. As Linnaeus' generic concept finds its first expression here, and no other species is mentioned or referred to, this species must be accepted as the type species of the genus.

This idea of Copeland's that to typify Linnaean genera we must go back into "pre-Linnaean" (i.e., pre-1753) literature in order to interpret the first or original application of a generic name is entirely contrary to the Code and to current practice. It is the same idea that Otto Kuntze had back in 1891, when he adopted the 1737 edition of Linnaeus' Genera as the starting date, and consequently made his name anathema to most of the botanists of the 1890's and early 1900's. In fact even today Kuntze's application of names is suspect and rightly so. Linnaeus' generic concepts were much changed and amplified

[17] "The latest rule sends us to the next subsequent edition of the 'Genera,' but, to interpret the definition found there, we must still go back to the first edition, where the same definition is amplified by references which fix its type."

[18] "Fil. 86."

between 1737 and 1753, and to try to go back and find out his original concept would lead to wholesale changes in names, such as Kuntze actually proposed. For Copeland to try to revive and justify this discredited notion is almost inconceivable. Dr. R. E. Holttum in "Ferns of Malaya," 87. 1954, criticized Copeland's choice of type and indicated that it should be reconsidered, but he did not actually make any change himself.

The present rules regarding lectotypes and the "Guide for the Determination of Types" of the International Code for Botanical Nomenclature (1961 ed.) lead us in exactly the opposite direction, not backward to the maze of pre-Linnaean usages but forward to subsequent usage. The first subsequent author who has definitely or inferentially designated a suitable lectotype must be followed. The pertinent sections of the Guide are sections 4e and 4f:

> In cases when two or more elements were included in or cited with the original description, the reviewer should use his best judgment in the selection of a lectotype, but if another author has already segregated one or two elements as other taxa, the residue or part of it should be designated as the lectotype if its essential characters correspond with the original description. If it can be shown that the element best fitting the protologue has been removed, it should be restored and treated as the lectotype. Whenever the original material of a taxon is heterogeneous, the lectotype should be so selected as to preserve current usage unless another element agrees better with the protologue. The first choice of a lectotype must be followed by subsequent workers unless the original material is rediscovered, or unless it can be shown that the choice was based upon a misinterpretation of the protologue.

After the above-mentioned species were removed to other genera (*Asplenium*, *Adiantum*, *Davallia*, and *Hymenophyllum*) there remained in *Trichomanes* only *T. membranaceum*, *T. crispum*, *T. polypodioides*, *T. pyxidiferum*, *T. scandens*, and *T. capillaceum*. These were all retained unchanged in the genus without any designation of a type until Presl's "Hymenophyllaceae" (1843). He removed *T. membranaceum* to a distinct genus, *Lecanium*, and placed *T. crispum* in a different subgenus, *Trichomanes* subg. *Achomanes*, thus removing it from consideration as a possible lectotype. *Trichomanes polypodioides* and *T. capillaceum* were not mentioned by Presl. In his *Trichomanes* subg. *Eutrichomanes* Presl retained only *T. pyxidiferum* and *T. scandens*, thus limiting the choice of lectotype to one of these. The choice was definitely made by John Smith [19] by citing *T. scandens* L. as the type of *Trichomanes*. This is the eminently suitable choice: It agrees with the protologue as well as any other species, it was not misinterpreted by Presl or John Smith, and in fact is one of the well-known West Indian species of the genus, and it maintains the usage of all authors up to the time of Copeland as to the true subg.

[19] Hist. Fil. 347. 1875.

Eutrichomanes, or subg. *Trichomanes* as it must now be called. The generic name *Vandenboschia* Copeland thus proves to be a superfluous, illegitimate name for the true *Trichomanes* L. to be abandoned by those who wish to continue to split up the Hymenophyllaceae into smaller genera.

Key to the Subgenera of *Trichomanes*

Venation anadromous; sori paratactic;[20] fronds mostly bipinnatifid to quadripinnatifid, rarely only pinnatifid, simple or merely lobed; segments not ciliate (except in *T. scandens*) or with stellate marginal hairs; false veins absent (except in sect. *Crepidomanes*).
  Rhizomes wide-creeping and fronds distant; stipes often relatively slender; plants epiphytic . . . . . Subg. **1. Trichomanes**
  Rhizomes erect or short-creeping, the fronds somewhat clustered; stipes often rather coarse; plants mostly terrestrial . . . . . Subg. **2. Pachychaetum**
Venation catadromous; sori epitactic; fronds not more than pinnate-pinnatifid, sometimes simple or merely lobed; segments often ciliate or with sessile stellate marginal hairs; false veins present or absent.
  False veins present between the true veins or in a submarginal position; fronds small, simple to bipinnatifid but not truly pinnate; plants always epiphytic . . . . . Subg. **3. Didymoglossum**
  False veins absent (except in sect. *Neurophyllum* with dark cross veins perpendicular to the true veins); fronds never simple, mostly deeply pinnatifid to once-pinnate; often terrestrial . . . . . Subg. **4. Achomanes**

Subg. 1. *Trichomanes*

Stipes distinctly different from the rhizomes; rhachis not proliferous.
  Blades one cell thick throughout, at least mostly not pilose.
    Cells not perpendicular to the veins, the distal walls not thickened.
      Marginal cells not differentiated.
        Blades bipinnatifid to quadripinnatifid, the ultimate segments with a single, unforked vein.
          Blades ciliate, the hairs simple or forked at base. False veins absent. West Indies . . . . . Sect. **1. Trichomanes**
          Blades not ciliate.
            False veins absent . . . . . Sect. **2. Lacosteopsis**
            False veins present . . . . . Sect. **3. Crepidomanes**
        Blades simply pinnate or pinnate-pinnatifid, the segments broad, with a continuous midrib and forked veinlets. Australia, Tasmania, and New Zealand . . . . . Sect. **4. Phlebiophyllum**
      Marginal cells (one or two rows) slightly differentiated from the others, more elongate. Philippines and Sumatra to Tahiti and New Zealand. Sect. **5. Crepidium**
    Cells of the segments more or less perpendicular to the veins and elongate, the distal walls thickened and giving the appearance of false veins. Philippines . . . . . Sect. **6. Abrodictyum**
  Blades two or three cells thick near the principal veins. Blades delicate, often glaucous or whitish, sometimes pilose on the surfaces near the veins but

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[20] See the introduction (p. 158) for a definition of this term.

not ciliate; rhizomes long-creeping, very delicate. Ceylon and Philippines to Tahiti . . . . . Sect. **7. Pleuromanes**

Stipe bases bearing rhizoids and hardly distinguishable from the rhizomes; rhachis often divided once or more times ("rhachis proliferous"). Old World. Sect. **8. Gonocormus**

Subg. 2. *Pachychaetum*

Cell walls usually thick, pitted or wavy.
- Fronds bipinnate to tripinnate.
  - Fronds one cell thick . . . . . Sect. **9. Pachychaetum**
  - Fronds ca. three cells thick. American tropics . . . Sect. **10. Davalliopsis**
- Fronds once-pinnate. Old World . . . . . Sect. **11. Cephalomanes**

Cell walls thin, straight, not pitted.
- Stipes and rhachises with stiff, bristle-like hairs. Sumatra to Tahiti and Hawaii. Sect. **12. Callistopteris**
- Stipes, rhachises, and blades with only minute, submicroscopic, clavate hairs. Ryukyu Islands, Philippines, and Java to Polynesia . Sect. **13. Nesopteris**

Subg. 3. *Didymoglossum*

Fronds simple to bipinnatifid, without marginal "scales."
- Fronds with dark, stellate hairs along the margins, lacking a differentiated submarginal row of cells . . . . . Sect. **14. Didymoglossum**
- Fronds glabrous on the margin, a submarginal row of cells slightly different from the others sometimes present . . . . . Sect. **15. Microgonium**

Fronds simple or slightly lobate, with paired, marginal, scalelike projections. American tropics . . . . . Sect. **16. Lecanium**

Subg. 4. *Achomanes*

Fronds not ciliate, the hairs of the costae and stipe simple, coarse.

Fertile and sterile fronds not dimorphic.
- Blades simply pinnate, radicant at the apex; sterile pinnae toothed.
  - Dark cross-walls (false veins) perpendicular to the true veins present. American tropics . . . . . Sect. **18. Neurophyllum**
  - Dark cross-walls (false veins) absent. South America. Sect. **19. Odontomanes**
- Blades simply pinnate to tripinnatisect, not radicant at the apex; sterile segments not toothed. False veins absent.
  - Rhizomes long-creeping and fronds distant. American tropics. Sect. **20. Lacostea**
  - Rhizomes erect or short-creeping and fronds more or less adjacent. American tropics . . . . . Sect. **21. Trigonophyllum**

Fertile and sterile fronds dimorphic.

Rhizomes widely creeping; fronds scattered, distichous. South America. Sect. **22. Homoeotes**

Rhizomes erect; fronds clustered . . . . . **Sect. 23. Feea**
- Fertile fronds dissected, the involucres solitary and free. American tropics . . . . . Subsect. **Feea**
- Fertile fronds entire, ca. 3 cells thick, the involucres completely immersed. American tropics . . . . . Subsect. **Hymenostachis**

Fronds ciliate.
Cilia simple.
Cilia with a dark bulbous base; blades pinnate-pinnatifid. American tropics . . . . . Sect. **24. Ragatelus**
Cilia without a markedly bulbous dark base; blades simply-pinnate. American tropics and West Africa . . . . . Sect. **17. Achomanes**
Veins without accessory wings not in the plane of the lamina.
Subsect. **Crispa**
Veins with accessory wings not in the plane of the lamina.
Subsect. **Lamellata**
Cilia stellate or forked at base. Blades pinnatifid to pinnate-pinnatifid. American tropics . . . . . Sect. **25. Acarpacrium**

Subg. 1. *Trichomanes*

Trichomanes subg. **Trichomanes**

Pyxidaria Gleditsch, Syst. Plant. 291. 1764. Lectotype: *Trichomanes scandens* L. Copeland (Gen. Hymen. 13) dismisses this name with the statement "This name has no status at all," which is hardly comprehensible. There is no category of names "without status"; names are either valid or invalid, legitimate or illegitimate. *Pyxidaria* Gleditsch is validly published. It is illegitimate, since it was superfluous, being merely a change of name for *Trichomanes* L., because Gleditsch took up the name *Trichomanes* in the "pre-Linnaean" sense as used by Tournefort for *Asplenium trichomanes* L. It must be remembered that Gleditsch was writing only about 10 years after the publication of Linnaeus' "Species Plantarum" (1753) and "Genera Plantarum" (ed. 5, 1754) and did not know that botanical nomenclature was later to be accepted as beginning at that time. From his point of view it was quite proper to reestablish Tournefort's genus *Trichomanes* and to rename Linnaeus' *Trichomanes* as *Pyxidaria*. No species was indicated for *Pyxidaria* and since the diagnosis is essentially the same as the Linnaean diagnosis for *Trichomanes*,[21] *Pyxidaria* is to be considered as based on the same type as *Trichomanes* and to be an absolute nomenclatural synonym.[22]

Trichomanes subg. *Eutrichomanes* Presl, Hymen. 16. 1843. Lectotype: *Trichomanes scandens* L.

Trichomanes subg. *Eutrichomanes* [sect.] *Pinnata* Presl, Hymen. 16. 1843. Lectotype: *Trichomanes scandens* L. This section originally included many species, but since it included the lectotype species of *Trichomanes* it should be considered as a nomenclatural synonym of sect. *Trichomanes*, with the same lectotype.

Trichomanes sect. *Eutrichomanes* (Presl) Moore, Ind. Fil. cx. 1857.

Trichomanes [subg.] *Minora* Prantl, Untersuch. Morph. Gefässkrypt. 1:

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[21] Gen. Plant. ed. 5. 1754.

[22] Incidentally, it might be mentioned that *Pteris* Gleditsch (Syst. Plant. 289. 1764), omitted from the "Index Filicum," is not the same genus as *Pteris* L. Gleditsch describes his *Pteris* as having a dorsal, centrally petiolate, peltate indusium, which indicates that he intended it to apply to the genus now called *Polystichum* (i.e., *P. lonchitis*). The Linnaean *Pteris* is renamed *Cincinalis* Gleditsch (Syst. Nat. 290. 1764); however, the species name *Cincinalis aquilina* Gleditsch does not occur here as it is indicated in the "Index Filicum."

51. 1875. Lectotype: *Trichomanes intramarginale* Hook. & Grev. Prantl divided his restricted *Trichomanes* into two groups, "*Minora*" and "*Maiora,*" each with a description. Since these both contained sections so named they must be considered to be subgeneric names, although Prantl may have thought of them as merely descriptive. Both of them refer to subg. *Trichomanes* as I delimit that subgenus, and so they do not cause any nomenclatural complications. A lectotype has been arbitrarily selected, the type of the first section included by Prantl within his subg. *Minora.*

Trichomanes [subg.] *Maiora* Prantl, Untersuch. Morph. Gefässkrypt. 1: 52. 1875. Lectotype: *Trichomanes scandens* L. See the remarks above under subg. *Minora* concerning this name. Since this subgenus included the type of *Trichomanes,* it follows that the lectotype must be the same, *T. scandens* L.

Trichomanes subg. *Holophlebium* Christ, Farnkr. Erde 27. 1897. Lectotype: *Trichomanes scandens* L. Christ recognized four subgenera, the monotypic *Serpyllopsis* and *Cardiomanes, Hemiphlebium* (with the sections *Microgonium, Lecanium,* and *Euhemiphlebium*) characterized by the presence of false veins, and *Holophlebium,* without false veins, which contained all the rest of the genus, including the section *Eutrichomanes. Holophlebium* was therefore another name for the typical subgenus, with the same type as subg. *Trichomanes.*

As I construe it, the subg. *Trichomanes* is divisible into eight sections.

Trichomanes sect. 1. Trichomanes

LECTOTYPE: *Trichomanes scandens* L. See the discussion above concerning the typification of *Trichomanes.*

This typical section may be monotypic, containing only the common West Indian *T. scandens.* This has always been grouped with and considered closely allied to *T. radicans* Swartz, but it does differ somewhat in habit, in the ciliate fronds, and also in chromosome number as indicated by T. Walker. In *T. scandens* the number is $n=64$, presumably a polyploid on the base number $x=17$, whereas *T. radicans* (and related species so far as known) has $n=36$ or 72 (i.e., with a base $x=9$).

Trichomanes sect. 2. Lacosteopsis Prantl.

Trichomanes sect. *Lacosteopsis* Prantl, Untersuch. Morph. Gefässkrypt. 1: 53. 1875. Lectotype: *Trichomanes luschnathianum* Presl. There were two original species, *T. radicans* Swartz and *T. luschnathianum* Presl. In the "Index Fllicum," Christensen selected as type *T. rupestre* (Raddi) v. d. Bosch, not one of the original species. He intended *T. luschnathianum,* which he considered a taxonomic synonym. Copeland (Gen. Hymen. 15 1938) wrongly picked the first cited species, which he indicates as "*Trichomanes 'radicans'* = *T. rupestre*(?)." This is a misinterpretation. The *T. radicans* cited by Prantl was the true *radicans* of Swartz, and not *T. rupestre,* as shown by the specimens cited. Copeland's typification must be rejected because of the prior typification of Christensen. The species *T. rupestre* is rather peculiar and isolated, but the relationship is evidently with *T. radicans* Swartz and not with the group of *T. crispum* L. where Copeland placed it.

Trichomanes sect. *Eutrichomanes* [subsect.] *Lacostea* [series] *Trichomanopsis* van Alderw. van Rosenb. Malay. Ferns 84. 1908. Lectotype: *Trichomanes aphlebioides* Christ. Although no definite rank was assigned by van Alderwerelt van Rosenburgh to his group *Trichomanopsis*, by working downward one can consider it to have been a series. Since no rank has been assigned, this rank will stand as indicated here, by Art. 35 of the Code (1961 ed.).

Vandenboschia Copel. Phil. Journ. Sci. 67: 51. 1938. Type: *Vandenboschia radicans* (Swartz) Copel. =*Trichomanes radicans* Swartz. A superfluous illegitimate name since the type of *Trichomanes* is cited as a synonym.

Trichomanes subg. *Vandenboschia* (Copel.) Allen, Fl. N. Zeal. 34. 1961.[23]

This section *Lacosteopsis* includes *T. radicans* Swartz and most of the species included by Copeland in his genus *Vandenboschia*, with the exception of *T. scandens* L. (which I refer to sect. *Trichomanes*) and *T. pyxidiferum* L. (which I refer to sect. *Crepidomanes*, although with some slight doubt). Among the additional species referable here, mostly following Copeland, are: *T. abrotanifolium* v. d. Bosch, *T. amabile* Nakai, *T. angustatum* Carm., *T. aphlebioides* Christ, *T. auriculatum* Blume, *T. axillare* Sodiro, *T. beckeri* Krause, *T. birmanicum* Bedd., *T. boschianum* Sturm, *T. brachyblastos* Mett., *T. bradei* Christ, *T. capillaceum* L., *T. cellulosum* Kl., *T. clathratum* Tag., *T. cocos* Chr., *T. colensoi* Hook. f., *T. collariatum* v. d. B., *T. cyrtotheca* Hillebr., *T. cystoceiroides* Christ, *T. davallioides* Gaud., *T. debile* v. d. Bosch., *T. diaphanum* H. B. K., *T. draytonianum* Brack., *T. exsectum* Kunze, *T fallax* Christ, *T. fargesii* Christ, *T. giganteum* Bory, *T. goetzii* Hieron., *T. haughtii* Morton, *T. herzogii* Rosenst., *T. hymenophylloides* v. d. Bosch, *T. hypnoides* Christ, *T. ingae* C. Chr., *T. johnstonense* Bailey, *T. junceum* Christ, *T. latifrons* v. d. Bosch, *T. latisectum* Christ, *T. liukiuense* Yabe, *T. longifrons* Nakai, *T. maximum* Blume, *T. melanotrichum* Schlecht., *T. miyakei* Yabe, *T. naseanum* Christ, *T. nipponicum* Nakai, *T. orientale* C. Chr., *T. parvum* Copel., *T. philippianum* Sturm, *T. schmidianum* Zenker, *T. serratifolium* Rosenst., *T. sinuatum* Bonap., *T. somae* Nakai, *T. stenosiphon* Christ, *T.* ***subclathratum*** (K. Iwatsuki) Morton, comb. nov. (*Vandenboschia subclathrata* K. Iwatsuki, Acta Phytotax. Geobot. 17: 70. 1958), *T. tenerum* Spreng., *T. tenuissimum* v. d. Bosch, *T.* ***titibuense*** (Ito) Morton, comb. nov. (*Vandenboschia titibuensis* Ito, Journ. Jap. Bot. 24: 125, *f. 1*. 1949), *T. ulei* Christ, *T. virgatulum* v. d. Bosch, and *T. wildii* Bailey (?).

Trichomanes sect. **3. Crepidomanes** (Presl) Prantl.

Trichomanes subg. *Crepidomanes* Presl, Epim. Bot. 17. 1849 [1851]. Type: *Trichomanes intramarginale* Hook. & Grev., the sole original species. In his "Genera Hymenophyllacearum" (p. 14), Copeland correctly had the type

[23] Holttum, Ferns Malaya 105. 1954, has *Trichomanes* subg. *Vandenboschia*, but since the basionym was not indicated and since it was published after the date requiring the definite citation of basionyms for valid publication, Holttum's subgeneric name must be considered invalid.

as *T. intramarginale,* from Ceylon, but in the "Genera Filicum" he arbitrarily changed it to *T. brevipes* Presl, on the grounds that Presl's description was based largely on specimens of *T. brevipes*; this is a mere supposition on his part; Presl's description *may* have been based in part on this Philippine species but it was also based in part on the cited true type *T. intramarginale* Hook. & Grev.

Crepidomanes (Presl) Presl, Epim. Bot. 258. 1849 [1851]. A raising, in the Addenda et Corrigenda, of his subg. *Crepidomanes* to generic rank, with the same single species.

Taschneria Presl, Epim. Bot. 258. 1849 [1851]. Type: This is a nomen nudum based on *Trichomanes filicula* Bory. No subsequent author took up the name *Taschneria* until Christensen's *Trichomanes* subg. *Eutrichomanes* sect. *Taschneria.*

Trichomanes sect. *Crepidomanes* (Presl) Prantl, Untersuch, Morph. Gefässkrypt. 1: 51. 1875.

Trichomanes sect. *Didymoglossum* sensu Prantl, Untersuch. Morph. Gefässkrypt. 1: 52. 1875, not *Didymoglossum* Desv. (1827).

Trichomanes sect. *Taschneria* C. Chr. Ind. Fil. XV. 1906. Type: Based on the description of *Trichomanes* sect. *Didymoglossum* sensu Prantl (1875), not *Didymoglossum* Desv. (1827). The type was wrongly indicated by Christensen as *T. bipunctatum* Poir., because he considered the true type *T. filicula* Bory as a taxonomic synonym of *T. bipunctatum* Poir. The type is *T. filicula* Bory, as Presl had it. Copeland, in his paper on *Trichomanes* (p. 174) recognized a Group *Taschneria,* but "group" is not a recognized taxonomic category. Later, Copeland considered *Taschneria* as a synonym of *Crepidomanes,* apparently correctly.

The small section *Crepidomanes* contains probably only one New World species, *T. pyxidiferum* L., somewhat doubtfully referable to the section, and the following Old World species: *T. acutilobum* Ching, *T. acuto-obtusum* Hayata, *T. bilabiatum* Nees & Blume, *T. bilobatum* van Alderw. van Rosenb., *T. bipunctatum* Poir., *T. boninense* Koidzumi, *T. brevipes* (Presl) Baker, *T. clarenceanum* Ballard, *T. christii* Copel., *T. insigne* Beddome, *T. intramarginale* Hook. & Grev., *T. kurzii* Bedd., *T. latealatum* (v. d. Bosch) Christ, *T. latemarginale* D. C. Eaton, *T. majorae* Watts, *T. makinoi* C. Chr., *T. megistostomum* Copel., *T.* ***nanophyllum*** (Tagawa) Morton, comb. nov. (*Crepidomanes nanophyllum* Tagawa, Acta Phytotax. Geobot. 9: 142. 1940), *T. nymanii* Christ, *T. pervenulosum* van Alderw. van Rosenb., *T. plicatum* (v. d. Bosch) Beddome, *T. pseudocapillatum* van Alderw. van Rosenb., *T.* ***pseudonymanii*** (Hosokawa) Morton, comb. nov. (*Crepidomanes pseudonymanii* Hosokawa, Trans. Nat. Hist. Soc. Formosa 31: 44. 1941), *T. rothertii* van Alderw. van Rosenb., *T. rupicola* Racib., *T.* ***tagawanum*** (K. Iwatsuki) Morton, comb. nov. (*Crepidomanes tagawanum* K. Iwatsuki, Acta Phytotax. Geobot. 17: 161, *f. 1, 2.* 1958), *T. tosae* Christ, *T. venulosum* (Rosenst.) Copel., and *T. walleri* Watts (?).

Trichomanes sect. 4. Phlebiophyllum (v. d. Bosch) Prantl.

Phlebodium v. d. Bosch, Ned. Kruid. Arch. 4: 377. 1859, non J. Smith, 1841.

This name is cited by Copeland [24] as a validly published name, but it appears at the place cited only in synonymy as *Phlebodium brownii* v. d. Bosch in sched., as a synonym of *Trichomanes venosum* R. Brown. Before he published on this plant in 1861 van den Bosch evidently realized that the name *Phlebodium* was preoccupied and chose to call it *Phlebiophyllum*, which also turned out to be a homonym, of *Phlebophyllum* Nees (1832).

Phlebiophyllum v. d. Bosch, Versl. Meded. Konik. Akad. Wetens. Afd. Natuurk. 11: 321. 1861. Type: *Trichomanes venosum* R. Brown, the sole original species.

Trichomanes sect. *Phlebiophyllum* (v. d. Bosch) Prantl, Untersuch. Morph Gefässkrypt. 1: 52. 1875 (erroneously attributed to v. d. Bosch).

Polyphlebium Copel. Phil. Journ. Sci. 67: 55. 1938. New name for *Phlebiophyllum* v. d. Bosch (1861), non *Phlebophyllum* Nees (1832).

Trichomanes subg. *Polyphlebium* (Copel.) Allan, Flora New Zeal. 34. 1961.

This group was assigned sectional rank by Prantl and Christensen and formed Copeland's "group" *Phlebiophyllum*,[25] which was later recognized as a genus *Polyphlebium* Copel. No doubt *T. venosum* is a peculiar, isolated species by reason of its broad pinnae with forked veinlets, but it does not seem necessary to recognize it as a genus or even subgenus. It can take its place as a section, as Prantl and Christensen had it. The fact that as a genus *Phlebiophyllum* is a later homonym does not invalidate the use of this name at the sectional level. As a subgenus the proper name would be subg. *Polyphlebium* (Copel.) Allan.

Trichomanes sect. **5. Crepidium** (Presl) C. Chr.

Didymoglossum subg. *Crepidium* Presl, Hymen. 23. 1843. Type: The sole original species is *Didymoglossum humile* (Forst.) Presl = *Trichomanes humile* Forst. In his "Epimeliae," Presl suggested that *Crepidium* might be regarded as a genus but he did not actually adopt it. As a genus, the name would have been a later homonym of *Crepidium* Blume (1825), a genus of Orchidaceae. In his treatment of *Trichomanes*, Copeland treated this as one of his informal "groups," but in his "Genera Hymenophyllacearum" he raised it to a genus, as *Crepidopteris* Copel., a later homonym of *Crepidopteris* Sternb. (1838) and was therefore renamed *Crepidophyllum* C. F. Reed. As a genus Reed's name is correct, but I do not regard this group of species as sufficiently distinct to rank even as a subgenus. It can take its place as a section of subg. *Trichomanes*.

Trichomanes sect. *Crepidium* (Presl) C. Chr. Ind. Fil. XV. 1906.

Crepidopteris Copel. Phil. Journ. Sci. 67: 57. 1938, non Sternb. 1838. Based on *Didymoglossum* subg. *Crepidium* Presl.

Crepidophyllum C. F. Reed, Amer. Fern Journ. 38: 88. 1948. Based on *Didymoglossum* subg. *Crepidium* Presl.

Trichomanes subg. *Crepidopteris* (Copel.) Allen, Fl. N. Zeal. 35. 1961.[26]

The only species are probably: *T. apiculare* Fourn., *T. endlicherianum* Presl, *T. gracillimum* Copel., *T. humile* Forst. f., *T. samoense*

[24] Phil. Journ. Sci. 67: 14. 1938.

[25] Phil. Journ. Sci. 64: 131, 138. 1933.

[26] Holttum, Ferns Malaya 98. 1954, proposed subg. *Crepidopteris*, but invalidly without definite citation of basionym.

C. Chr., *T. vaupelii* Brause, *T. vieillardii* v. d. Bosch, and *T. werneri* Rosenst.

Trichomanes sect. **6. Abrodictyum** (Presl) Moore.

Abrodictyum Presl, Hymen. 20, *pl. 7*. 1843. Type: *Abrodictyum cumingii* Presl, the only original species=*Trichomanes cumingii* (Presl) C. Chr.

Trichomanes sect. *Abrodictyum* (Presl) Moore, Ind. Fil. ex. 1857.

Habrodictyon Presl ex v. d. Bosch, Versl. Meded. Konink. Akad. Wetens. Afd. Natuurk. 11: 321. 1861. This is an orthographic correction that probably ought not to be adopted, since it involves the first syllable of the name, although it is more correct orthographically. The case is similar to the general adoption of the original spelling *Eleocharis* (Cyperaceae) in preference to the orthographically more correct *Heleocharis*, or of *Aplopappus* rather than *Haplopappus*, although the latter has obtained some currency in the United States through its adoption by H. M. Hall in his monograph of the genus.

Trichomanes sect. *Leptomanes* Prantl, Untersuch. Morph. Gefässkrypt. 1: 52. 1875. Type: Five species were listed originally: *T. tenerum* Spreng., *T. schiedeanum* C. Muell., *T. trichoideum* Swartz, *T. exsectum* Kunze, and *T. smithii* Hook. Under the last-named species Prantl correctly listed *Abrodictyum cumingii* Presl as a synonym. Since Presl's genus *Abrodictyum* had been reduced to a section of *Trichomanes* by Moore and since there was no obstacle to its use as a sectional name, the name sect. *Leptomanes* Prantl was superfluous when published, since the prior and available name sect. *Abrodictyum* (Presl) Moore should have been adopted. It is therefore to be considered as merely an unacceptable change of name for *Abrodictyum* and therefore with the same type, *Abrodictyum cumingii* Presl. Christensen's choice [27] of *T. capillaceum* L. as type therefore has to be rejected; it was chosen because Christensen considered *T. trichoideum* Swartz as a taxonomic synonym of *T. capillaceum* L. Similarly, Copeland's choice [28] of *T. tenerum* on the basis that it was the first species listed by Prantl must be rejected also.

Trichomanes sect. *Eutrichomanes* [subsect.] *Abrodictyum* (Presl) van Alderw. van Rosenb. Malay. Ferns 83. 1908.

Trichomanes sect. **7. Pleuromanes** Presl.

Trichomanes sect. *Pleuromanes* Presl, Epim. Bot. 17. 1849 [1851]. Type: *Trichomanes acutum* Presl, the sole original species.

Pleuromanes (Presl) Presl, Epim. Bot. 258. 1849 [1851]. A raising in the Addenda et Corrigenda of his sect. *Pleuromanes* to generic rank with the same species *T. acutum* and the addition of a second species, *T. pallidum* Blume. In the Index Filicum (XV. 1906), Christensen erroneously gave the type as *T. pallidum*.[29]

Leucomanes Presl, Epim. Bot. 258. 1849 [1851]. A nomen nudum, based on *Trichomanes album* Blume; the name *Leucomanes* has never been used by any author either as a genus or section, because it represents the same group as Presl's *Pleuromanes*.

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[27] Ind. Fil. XV. 1906.

[28] Phil. Journ. Sci. 67: 15. 1908.

[29] Holttum (Ferns Malaya 97. 1954) proposed *Trichomanes* subg. *Pleuromanes*, but invalidly without specific citation of basionym.

Craspedoneuron v. d. Bosch, Versl. Meded. Konink. Akad. Wetens. Afd. Natuurk. 11: 322. 1861.[30] Lectotype: *Trichomanes album* Blume. The name *Craspedoneuron* first appeared in van den Bosch's treatment of the Hymenophyllaceae *in* Junghuhn's "Plantae Junghuhnianae" (p. 550. 1856), where it appeared as an accepted name, apparently as a subgenus, but without a description. It is indicated as containing "*T. album* etc.," which fixes the type as *album*. The name appeared later in van den Bosch's Synopsis [31] as a subgroup of *Trichomanes* but again without a description or stated rank. Copeland [32] also indicated the type as *Trichomanes album* Blume.

Trichomanes sect. *Craspedoneuron* (v. d. Bosch) Prantl, Untersuch. Morph. Gefässkrypt. 1: 52. 1875.

Although recognized by Copeland as a distinct genus, the group of *Trichomanes acutum* and *T. pallidum* does not appear to be very different from other groups of subg. *Trichomanes*. This section is distinguished by having the fronds more than one cell wide along the veins; although this character is well developed in *T. pallidum*, it is less evident in the type species *T. acutum* and seems to be absent in *T. latifrons*, which Copeland associated with the other two in his 1933 paper on *Trichomanes*. I recognize *Pleuromanes* as a section only with hesitation, awaiting further anatomical study. It will be limited to *T. acutum* and *T. pallidum*, the latter including *T. album* Blume, tentatively, and *T.* ***retusum*** (Copel.) Morton, comb. nov. (*Pleuromanes retusum* Copel. Phil. Journ. Sci. 73: 466. 1941). The whitish or bluish color of the fronds may be distinctive.

Trichomanes sect. **8. Gonocormus** (v. d. Bosch) Christ.

Gonocormus v. d. Bosch, Versl. Meded. Konink. Akad. Wetens. Afd. Natuurk. 11: 321. 1861.[33] Lectotype: *Trichomanes proliferum* Blume (selected by Christensen). Van den Bosch refers here species 1, 2, 9, and 10 of his "Synopsis," namely *T. parvulum* Poir., *T. saxifragoides* Presl, *T. proliferum* Blume, and *T. minutum* Blume, which W. A. Sledge (pers. comm.) considers a synonym of *T. proliferum*. Prantl (1875) accepted *Gonocormus* as a genus and listed four species in sect. *Gonocormus*, of which two are *G. prolifer and G. minutus*, thus limiting the choice of lectotype to one of these two species. In the Index Filicum (XIV. 1906) Christensen definitely selected *T. proliferum* as the type; therefore Copeland's selection (Gen. Hymen. 14. 1938) of *T. minutum* as type must be rejected. Copeland selected the first species listed by van den Bosch in his "Hymenophyllaceae Javanicae," *G. minutus*, but the first-named species is not automatically the type of course. This does not change the application of the name, since *T. minutum and T. proliferum* are not different specifically.

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[30] Also published in Verhandl. K. Akad. Wetens. Amsterdam 9, Hym. Jav. 12. 1861, without description.

[31] Ned. Kruid. Arch. 4: 361. 1859.

[32] Phil. Journ. Sci. 67: 14. 1938.

[33] Also published Verhandl. K. Akad. Wetens. Amsterdam 9, Hym. Jav. 7. 1861, without description.

Gonocormus sect. *Gonocormus* Prantl, Untersuch. Morph. Gefässkrypt. 1:51. 1875.

Trichomanes sect. *Gonocormus* (v. d. Bosch) Christ, Farnkr. Erde 27. 1897 (erroneously attributed to v. d. Bosch).

Trichomanes subg. *Gonocormus* (v. d. Bosch) C. Chr. Ind. Fil. XIV, 634. 1906.

Trichomanes sect. *Eutrichomanes* [subsect.] *Gonocormus* van Alderw. van Rosenb. Malay. Ferns 83. 1908.

This somewhat peculiar group, best distinguished by its "proliferous" fronds, can rank best merely as a section of subg. *Trichomanes*. The following are probably referable here: *T. alagense* Christ, *T. assimile* Mett., *T. bonapartei* C. Chr., *T. boninicola* Nakai, *T. brooksii* Copel., *T. gracile* v. d. Bosch, *T. latilabiatum* E. Brown, *T. mannii* Hook., *T. matthewii* Christ, *T. novoguineense* Brause (?), *T. ruwenzoriense* Taton, *T. subtilissimum* Brause, *T. teysmannii* v. d. Bosch, and *T. trinerve* Baker.

Subg. 2. *Pachychaetum*

Trichomanes subg. **2. Pachychaetum** Presl

Trichomanes subg. *Pachychaetum* Presl, Hymen. 16. 1843. Lectotype: Six species were originally assigned to this subgenus: *T. luschnathianum* Presl, *T. rigidum* Swartz, *T. firmulum* Presl, *T. pyramidale* Wall., *T. speciosum* Willd., and *T. brevisetum* Spreng. Since these species do not really form a natural group, a type could be chosen only arbitrarily. In proposing *Trichomanes* subg. *Eutrichomanes* sect. *Pachychaetum* (Presl) C. Chr., Christensen [34] designated *T. rigidum* Swartz as the type, and this therefore must stand as the lectotype. Copeland's choice of *T. luschnathianum* Presl as lectotype (Gen. Hymen. 14. 1938) merely on the basis that this was the first-cited species cannot be upheld.

Trichomanes subg. *Macroglena* Presl, Abhandl. Boehm. Gesell. Wiss. V, 5: 333. 1848.[35] Type: Five species were originally named: *T. gemmatum* J. Smith, *T. cellulosum* Klotzsch, *T. foeniculaceum* Bory ex Willd., *T. angustissimum* Presl, *T. meifolium* Bory ex Willd. *Trichomanes meifolium* was selected as lectotype by Christensen [36] and there is no reason to make any change. The group was distinguished by Copeland as a genus distinct from *Selenodesmium* by the "bristle-like segements," i.e., with the laminae only 1 or 2 cells wide on either side of the midveins, which is true of the

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[34] Ind. Fil. XV. 1906.

[35] As noted elsewhere in this article, the groups in Presl's work denoted by the symbol § are not sections, as this sign usually denotes, but are subgenera, which Presl calls them several times. He also calls them "paragraphs" on occasion but this is not a recognized botanical category. Presl used the term "sectio" (or rather misused it, according to our present concepts) for a suprageneric group, as for instance in the "Epimeliae Botanicae," p. 103, where the family Blechnaceae is divided into sectio Blechneae and sect. Blechnopsideae, each with several genera. Therefore, the combination *Trichomanes* subg. *Macroglena* (Presl) Allan, Flora New Zeal. 36. 1961, is superfluous, since it is the same as the original publication of Presl.

[36] Ind. Fil. XV. 1906.

type species, *T. meifolium*, and some others, such as *T. asa-grayi*; some species referred to *Macroglena* by Copeland, as for instance the New Zealand *T. strictum* Menzies and *T. caudatum* Brack., definitely do not have setaceous segments and approach closely *T. rigidum* Swartz, the type species of *Selenodesmium*.

Trichomanes sect. *Selenodesmium* Prantl, Untersuch. Morph. Gefässkrypt. 1: 53. 1875.[37] Type: There were three original species, *T. rigidum* Swartz, *T. obscurum* Blume, and *T. elongatum* Cunningham. By placing sect. *Selenodesmium* as a synonym of sect. *Pachychaetum*, Christensen[38] effectively chose *T. rigidum* Swartz as lectotype, also the lectotype of sect. *Pachychaetum*. Christensen was wrong in adopting sect. *Pachychaetum* as the correct sectional name under the subgeneric name *Eutrichomanes*, inasmuch as *Selenodesmium* had priority as a sectional name, *Pachychaetum* having been originally proposed as a subgeneric name. However, this has no bearing on the effectiveness of the choice of a lectotype. When, as here, *Pachychaetum* is recognized as a subgenus distinct from *Trichomanes* ["*Eutrichomanes*"] then the proper sectional name must be *Pachychaetum*, repeating the subgeneric name according to the Code.

Macroglena (Presl) Copel. Phil. Journ. Sci. 67: 82. 1938.
Selenodesmium (Prantl) Copel. Phil. Journ. Sci. 67: 80. 1938.

The subgenus *Pachychaetum* is divisible into five sections, as follows.

Trichomanes sect. **9. Pachychaetum.**

Among the species referable to sect. *Pachychaetum* are: *T. angustimarginatum* Bonap., *T. asa-grayi* v. d. Bosch, *T. batrachoglossum* Copel., *T. caudatum* Brack., *T. compactum* van Alderw. van Rosenb., *T. cupressoides* Desv., *T. dentatum* v. d. Bosch, *T. elongatum* A. Cunn., *T. extravagans* Copel., *T. ferrugineum* Fourn., *T. flavofuscum* v. d. Bosch, *T. gemmatum* J. Smith, *T. laetum* v. d. Bosch, *T. longicollum* v. d. Bosch, *T. meifolium* Bory ex Willd., *T. obscurum* Blume, ***T. obtusum*** (Copel.) Morton, comb. nov. (*Macroglena obtusa* Copel. Phil. Journ. Sci. 84: 163. 1955), *T. pariflorum* Poir., *T. schlechteri* Brause, *T. schultzei* Brause, *T. setaceum* v. d. Bosch, *T. siamense* Christ, *T. strictum* Menzies, *T. stylosum* Poir., *T. tamarisciforme* Jacq., *T. teretricaulum* Ching, *T. trichophyllum* Moore, *T.* ***truncatum*** (Copel.) Morton, comb. nov. (*Macroglena truncata* Copel. Occas. Pap. Bern. Bishop Mus. 14: 51, *pl. 4*. 1938), and *T. warburgii* Christ (?).

Trichomanes sect. **10. Davalliopsis** (v. d. Bosch) Prantl.

Davalliopsis v. d. Bosch, Versl. Meded. Konink. Akad. Wetens. Afd. Natuurk. 11: 323. 1861. Type: Copeland (Gen. Hymen. 82. 1938) commented that "Van den Bosch established this genus imperfectly, publishing no specific name under it; but his name fortunately was retained for subgeneric or section use by Prantl and Christensen." He evidently believed that it was necessary to publish a specific name for a genus to be validly described, but there is no such provision in the nomenclature rules. It was not necessary for any

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[37] Holttum, Ferns Malaya 108, 1954, proposed *Trichomanes* subg. *Selenodesmium*, but invalidly without definite citation of the basionym.

[38] Ind. Fil. XV. 1906.

species to be named prior to the present requirement that types be indicated after Jan. 1, 1958. Although he did not make any combinations under the name *Davalliopsis*, van den Bosch did name two species as belonging to his genus: species 86 and 87 of his "Synopsis," *T. prieurii* Kunze and *T. anceps* Hook. (p.p.). In reducing this genus to a section of *Trichomanes*, Prantl listed only *T. prieurii*, thus effectively choosing this species as lectotype. Christensen (Ind. Fil. XV. 1906) wrongly stated the type to be *T. elegans* L. C. Richard, which is considered to be the same as *T. prieurii*.

Trichomanes sect. *Davalliopsis* (v. d. Bosch) Prantl, Untersuch. Morph. Gefässkrypt. 53. 1875.

Trichomanes sect. **11. Cephalomanes** (Presl) Morton, comb. nov.

Cephalomanes Presl, Hymen. 17, *pl. V*. 1843. The type and sole original species is *Cephalomanes atrovirens* Presl = *Trichomanes atrovirens* (Presl) Kunze. The type stated by Christensen in Ind. Fil. XIV. 1906, *Trichomanes javanicum*, is impossible, since it was not mentioned by Presl in the original description. In 1848 Presl enlarged the genus to include five species, of which *T. javanicum* was one;[39] it was further enlarged to nine species by van den Bosch.[40] Prantl in 1875 made *Cephalomanes* a section of *Lacostea* v. d. Bosch (1861), which is nomenclaturally impossible, since *Cephalomanes* has priority. *Cephalomanes* may tentatively be regarded as a section, *Trichomanes* sect. *Cephalomanes* (Presl) Morton. The character by which Presl separated it, the globose-inflated tip of the receptacle, was either an illusion or an abnormality. Copeland in his key in "Genera Hymenophyllacearum" separates *Cephalomanes* from *Trichomanes* (as typified by *T. crispum*) merely by the former being "Oriental" and the latter "American," hardly a generic distinction, and Copeland's discussion does not really bring out any characters. However, *Cephalomanes* may be distinguished by having the venation anadromous and the sori paratact, whereas *Trichomanes* subg. *Achomanes* (as typified by *T. crispum*) has the venation catadromous and the sori epitact. However, I have not examined all species with regard to these characters, which may not hold.

Trichomanes [subg.] *Schizophlebium* v. d. Bosch in Junghuhn, Plant. Junghuhn. 551. 1856, nom. nud. Based on *Trichomanes javanicum* Blume. In his first paper on Hymenophyllaceae, in "Plantae Junghuhnianae" (1856), van den Bosch adopted several of Presl's subgenera, such as *Crepidomanes*, and indicated them with the same sign as Presl used; therefore I consider that the new names proposed here by van den Bosch were also subgenera. Since no rank has been assigned by any other author, my decision will stand under the Code. All of van den Bosch's own names were nomina nuda, which he later ignored, and so the matter is of little importance in that respect. But if van den Bosch's groups were to be considered sections, then the various Presl names adopted would all be new combinations as sections and this would cause some changes in the sectional nomenclature. Therefore, it seems best to consider all of these groups as subgenera.

Lacostea v. d. Bosch sect. *Cephalomanes* (Presl) Prantl, Untersuch. Morph. Gefässkrypt. 1: 50. 1875.

Trichomanes sect. *Eutrichomanes* [subsect.] *Lacostea* [series] *Cephalomanes* (Presl) van Alderw. van Rosenb. Malay. Ferns 84. 1908.

Trichomanes subg. *Cephalomanes* (Presl) C. Chr. Ind. XIV. 1906.[41]

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[39] Abhandl. Boehm. Gesell. V, 5: 334. 1848.

[40] Ned. Kruid. Arch. 4: 350–352. 1859.

[41] Also proposed by Bonap. Notes Pterid. 8: 26. 1919.

Probably the only species of sect. *Cephalomanes*, all Old World, are: *T. acranthum* Ito, *T. acrosorum* Copel., *T. atrovirens* (Presl) Kunze, *T. boryanum* Kunze, *T. crassum* Copel., *T. densinervium* Copel, *T. foersteri* Rosenst., *T. infundibulare* van Alderw. van Rosenb., *T. javanicum* Blume, *T. kingii* Copel., *T. ledermannii* Brause, *T. madagascariense* Moore, *T. maluense* Brause, *T.* ***preslii*** Morton, nom. nov. (*Trichomanes asplenioides* Presl, Hymen. 37. 1843, non Swartz, 1788), *T. singaporianum* (v. d. Bosch) van Alderw. van Rosenb., *T. suffrutex* van Alderw. van Rosenb., and *T. sumatranum* van Alderw. van Rosenb.

Trichomanes sect. 12. **Callistopteris** (Copel.) Morton, comb. nov.

Callistopteris Copel. Phil. Journ. Sci. 67: 64. 1938. Type: *Trichomanes apiifolium* Presl, chosen by Copeland.

The only known species, all Old World, are: *Trichomanes apiifolium* Presl, *T. bauerianum* Endlicher, *T. baldwinii* D. C. Eaton, *T.* ***calyculatum*** (Copel.) Morton, comb. nov. (*Callistopteris calyculata* Copel. Occas. Pap. Bern. Bishop Mus. 14: 50, *pl. 3.* 1938), and *T. societense* J. W. Moore (*T. polyanthum* Hook., non *T. polyanthos* Swartz).

Trichomanes sect. 13. **Nesopteris** (Copel.) Morton, comb. nov.

Nesopteris Copel. Phil. Journ. Sci. 67: 65. 1938. Type: *Trichomanes grande* Copel., chosen by Copeland.[42]

This and the preceding section are similar and perhaps should be united. However, for the present they should be left as separate sections, since they may not be truly allied. The only species, all Old World, are: *T. blepharistomum* Copel., *T. grande* Copel., *T. intermedium* v. d. Bosch, *T. pseudoblepharistomum* Tagawa, *T. superbum* Backhouse, and *T. thysanostomum* Makino.

Subg. 3. *Didymoglossum*

Trichomanes subg. **3. Didymoglossum** (Desv.) C. Chr.

Didymoglossum Desv. Mém. Soc. Linn. Paris 6: 330. 1827. Lectotype: Eight species were originally included: *D. muscoides, pusillum, punctatum, decipiens, alatum, lineare, filicula,* and *magellanicum* (*lineare* and *magellanicum* are referable to *Hymenophyllum* rather than *Trichomanes*). The first subsequent author to recognize *Didymoglossum* was Presl (1843), who divided the tribe Trichomanoideae into two groups, Trichomaneae and Didymoglosseae, distinguished by having the limb of the involucre entire or 2-lipped, respectively. These groups are termed "sectio" by Presl, and so they must be considered invalid, since the category "sectio" was misused for a suprageneric rather than infrageneric group as required by the Code. Presl divided *Didymoglossum* into three subgenera—*Eudidymoglossum, Chilodium,* and *Crepidium*; in *Eudidymoglossum* he included *D. muscoides, punctatum, alatum, decipiens,* and *filicula,* made *D. pusillum* the type of a new genus, *Hemiphlebium,* and removed *lineare* and *magella-*

[42] Holttum, Ferns Malaya 108, 1954, proposed *Trichomanes* subg. *Nesopteris*, but invalidly, without the definite citation of the basionym.

nicum from the group Didymoglosseae entirely. In his "Epimeliae Botanicae" (1851), Presl indicated that the species *filicula* should be removed from *Didymoglossum* as the genus *Taschneria*, thus effectively limiting the choice of lectotype to the four species remaining in the genus, *D. muscoides, punctatum, alatum,* and *decipiens.* Unfortunately, van den Bosch, followed by Prantl, limited *Didymoglossum* to *D. filicula* (now properly known as *Trichomanes bipunctatum* Poir.) and its allies, thus seeming to provide a lectotype. However, such a typification would upset current nomenclature and it can be rejected on the basis that Presl had excluded *filicula* from the genus, even though he failed to provide his segregate genus *Taschneria* with a validating description; in 1851 the publication of the combination *Taschneria filicula* could have been taken as sufficient for a monotypic new genus. No further treatment of *Didymoglossum* was published until Christensen [43] proposed *Trichomanes* subg. *Didymoglossum* with the type *T. hymenoides* Hedw., which Desvaux had listed as a synonym of his *D. muscoides.* This effectively chooses *T. muscoides* as lectotype, which fortunately does maintain the current application of the name.

Didymoglossum subg. *Eudidymoglossum* (Desv.) Presl, Hymen. 23. 1843.

Didymoglossum subg. *Eudidymoglossum* [sect.] *Flabellata* Presl, Hymen. 23. 1843. Lectotype: *Didymoglossum sphenoides* (Kunze) Presl=*T. sphenoides* Kunze.

Didymoglossum subg. *Eudidymoglossum* [sect.] *Pinnata* Presl, Hymen. 23. 1843. Lectotype: *Didymoglossum muscoides* (Swartz) Desv.=*T. muscoides* Swartz.

Trichomanes sect. *Didymoglossum* (Desv.) Moore, Ind. Fil. CX. 1857.

Trichomanes subg. *Didymoglossum* (Desv.) C. Chr. Ind. Fil. XIV. 1906.

As I construe it, subg. *Didymoglossum* contains three sections, as follows.

Trichomanes sect. 14. Didymoglossum

The sect. *Didymoglossum,* the American species recently monographed by Wessels Boer, contains the following American species: *Trichomanes angustifrons* (Fée) W. Boer, *T. curtii* Rosenst., *T. gourlianum* Grev., *T. hymenoides* Hedw., *T. krausii* Hook. & Grev., *T. lineolatum* (v. d. Bosch) Hook., *T. melanopus* Baker, *T. nummularium* (v. d. Bosch) C. Chr., *T. ovale* (Fourn.) W. Boer, *T. petersii* A. Gray, *T. pinnatinervium* Jenm., *T. punctatum* Poir., *T. pusillum* Swartz, *T. reptans* Swartz, and *T. rhipidophyllum* Slosson. In addition, a very few Old World species are presumed to belong here, such as *T. exiguum* (Beddome) Baker, *T. giesenhagenii* C. Chr., *T. liberiense* Copel., and *T. wallii* Thwaites.

Trichomanes sect. **15. Microgonium** (Presl) Christ.

Microgonium Presl, Hymen. 19, *pl. 6, f. A, B.* 1843. Type: Two species were originally assigned to the genus, *M. cuspidatum* (Willd.) Presl and *M. berteroanum* Presl. The first of these, *Trichomanes cuspidatum* Willd., was chosen lectotype by Christensen (Ind. Fil. XIV. 1906).

Hemiphlebium sect. *Microgonium* (Presl) Prantl, Untersuch. Morph. Gefässkrypt. 1: 46. 1875.

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[43] Ind. Fil. XIV. 1906.

Trichomanes sect. *Microgonium* (Presl) Christ, Farnkr. Erde 24. 1897 (erroneously attributed to Presl).[44]

The four American species of sect. *Microgonium* were treated by Wessels Boer,[45] namely: *Trichomanes ekmanii* W. Boer, *T. godmanii* Hook., *T. hookeri* Presl, and *T. kapplerianum* Sturm. The Old World species are more numerous and include: *Trichomanes ballardianum* Alston, *T. bimarginatum* v. d. Bosch, *T. chamaedrys* Taton, *T. craspedoneurum* Copel., *T. cultratum* Baker, *T. cuspidatum* Willd., *T. erosum* Willd., *T.* ***falsivenulosum*** (Nishida) Morton, comb. nov. (*Microgonium falsivenulosum* Nishida, Journ. Jap. Bot. 32: 156. 1957), *T. fulgens* C. Chr., *T. henzaianum* Parish, *T. mindorense* Christ, *T. motleyi* v. d. Bosch, *T. omphalodes* (Vieillard) C. Chr., *T. papuanum* Brause, *T. sayeri* F. Muell. & Baker, and *T. sublimbatum* K. Muell.

Trichomanes sect. 16. Lecanium (Presl) Christ.

Lecanium Presl, Hymen. 11, *pl. 1.* 1843, non Reinw. 1825. Type: The only original species *Lecanium membranaceum* (L.) Presl = *Trichomanes membranaceum* L. Copeland stated that *Lecanium* Reinw. was not validly published because Reinwardt proposed both *Lecanium* and *Lecanopteris* as substitute names for his illegitimate genus *Onychium* Reinw. (1824) non *Onychium* Kaulf. (1820). However, according to the Code,[46] such alternative names are validly published if proposed prior to Jan. 1, 1953. The implication is that the genus *Lecanopteris* Reinw. was also validly published in 1825 by Reinwardt and not by Blume in 1828, as Copeland would have it. The species *T. membranaceum* L. is certainly peculiar but I do not think it represents a distinct genus, and therefore *Lecanium* Presl does not need to have a new generic name provided. It can conveniently rank as a section of subg. *Didymoglossum*, differing especially only in the strange marginal "scales." The fact that *Lecanium* is illegitimate as a genus does not mean that the name cannot properly be used at the sectional level.

Hemiphlebium sect. *Lecanium* (Presl) Prantl, Untersuch. Morph. Gefässkrypt. 1: 46. 1875.

Trichomanes sect. *Lecanium* (Presl) Christ, Farnkr. Erde 25. 1897 (erroneously attributed to Prantl).

Subg. 4. *Achomanes*

Trichomanes subg. **Achomanes** Presl

Trichomanes subg. *Achomanes* Presl, Hymen. 15. 1843. Lectotype: Presl adopted the name *Achomanes* from Necker (1790), whose "genus" *Achomanes* is cited by Presl as a synonym of *Trichomanes* on p. 13. However, since Necker's names are all invalid by the Code, Presl must be considered as the sole author of the subgenus, and Necker should not be cited as a parenthetical author, as has been done. The typification must be from Presl and not from Necker. The three groups into which Presl divided

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[44] Holttum, Ferns Malaya 91. 1954, proposed *Trichomanes* subg. *Microgonium*, but invalidly without the definite citation of the basionym.

[45] Acta Bot. Neerl. 11: 277–330. 1962.

[46] 1961 ed., Art. 34.

Trichomanes are preceded by the sign §, which usually denotes a section. However, on p. 31, where Presl is speaking of the subdivision of *Hymenophyllum* into four groups, he terms these groups subgenera. These groups are preceded by the same sign as the groups in *Trichomanes*, and therefore must also be considered subgenera and not sections. The instance noted above in *Hymenophyllum* is not the only place where such groups are called subgenera by Presl. As noted elsewhere in this paper, Presl used the term "sectio" for a suprageneric rather than infrageneric group. The matter is of great importance when deciding on the priority of subgeneric and sectional names in the Hymenophyllaceae. Presl included 16 species in his subg. *Achomanes*, among them *T. crispum* L. When Presl removed *T. crispum* from *Eutrichomanes*, he effectively eliminated it from consideration as a possible lectotype for *Trichomanes* itself, that is for subg. *Trichomanes*. As a section, the name *Achomanes* dates from van den Bosch (1859), where the group is preceded by the sectional sign and also referred to in a footnote as a section. By following the name *Achomanes* with "*T. crispum*, etc." van den Bosch inferentially chose *T. crispum* as lectotype, a choice confirmed later by Christensen in citing *T. crispum* as the type of *Trichomanes* subg. *Achomanes*.[47]

Trichomanes sect. *Achomanes* (Presl) v.d. Bosch, Ned. Kruid. Arch. 4: 358. 1859.

Ptilophyllum sect. *Achomanes* (Presl) Prantl, Untersuch. Morph. Gefässkrypt. 1: 47. 1875.

Trichomanes sect. *Euachomanes* C. Chr. Ind. Fil. XIV. 1906.

To those who wish to continue to segregate many genera in the Hymenophyllaceae, the question of the proper generic name for this group will arise at once. It was called *Trichomanes* L. by Copeland, but as I have shown above it was due to an incorrect and unacceptable typification on *T. crispum* L. It was called *Ptilophyllum* by Prantl, but this name is illegitimate and unavailable. Neither is *Achomanes* Necker available as a generic name, since Necker's names are specifically outlawed by the Code. The name to be adopted will depend on how finely workers wish to split up the group. If they accept the circumscription of Copeland, the earliest available name is *Ragatelus* Presl (1843). However, if they regard the species with dimorphic fronds as coming within the group, then *Feea* Bory (1824) will be the oldest name for the whole group. Other generic names that I include within subg. *Achomanes* are *Hymenostachis* Bory (1824), *Odontomanes* Presl (1851), *Neuromanes* Trev. (1859), and *Lacostea* v.d. Bosch.

Trichomanes subg. **Achomanes** sect. **17. Achomanes**

The section *Achomanes* may be divided into two subsections, as follows.

Trichomanes sect. **Achomanes** subsect. **Crispa** (Prantl) Morton, comb. nov.

Ptilophyllum sect. *Achomanes* [subsect.] *Crispa* Prantl, Untersuch. Morph. Gefässkrypt. 1: 47. 1875.

LECTOTYPE: *Trichomanes crispum* L.

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[47] Ind. Fil. XIV. 1906.

The species of sect. *Achomanes*, subsect. *Crispa*, are numerous but little known. This would be a fine group for monographic study for the plants are common and widely distributed and need to have reliable names. At the present time there are the following nominal species, but the actual number is probably much smaller: *T. accedens* Presl, *T. adscendens* Kunze, *T. anadromum* Rosenst. (?), *T. aureovestitum* Proctor, *T. badium* Fourn., *T. corcovadense* v. d. Bosch, *T. crassipilis* Weatherby, *T. crispum* L., *T. cristatum* Kaulf., *T. dactylites* Sodiro, *T. daguense* Weatherby, *T. delicatum* v. d. Bosch, *T. eriophorum* v. d. Bosch, *T. furcatum* v. d. Bosch, *T. galeottii* Fourn., *T. gardneri* v. d. Bosch, *T. guianense* Sturm, *T. holopterum* Kunze, *T. imbricatum* Sodiro, *T. kalbreyeri* Baker, *T. killipii* Weatherby, *T. lambertianum* Hook., *T. laxum* Klotzsch, *T. lindigii* Fourn., *T. lucens* Swartz, *T. ludovicianum* Rosenst., *T. macilentum* v. d. Bosch, *T. micayense* Hieron., *T. opacum* v. d. Bosch, *T. ornatulum* v. d. Bosch, *T. pellucens* Kunze, *T. procerum* Fée, *T. robustum* Fourn., *T. sellowianum* Presl, and *T. sublabiatum* v. d. Bosch. The above are all tropical American. One species is in western tropical Africa, *T. crispiforme* Alston.

Trichomanes sect. **Achomanes** subsect. **Lamellata** (Prantl) Morton, comb. nov.

Ptilophyllum sect. *Achomanes* [subsect.] *Lamellata* Prantl, Untersuch. Morph. Gefässkrypt. 1: 48. 1875.

TYPE: *Trichomanes martiusii* Presl, the only original species (presumed to be a taxonomic synonym of *T. pilosum* Raddi).

Inasmuch as the presence of accessory wings on the veins not in the plane of the frond is recognized as of subsectional importance in *Hymenophyllum* subg. *Sphaerocionium*, it seems only logical to recognize a similar group here in *Trichomanes*, as Prantl did. The only known species are *Trichomanes pilosum* Raddi (probably an aggregate) and *T. anomalum* Maxon & Morton.

Trichomanes sect. **18. Neurophyllum** (Presl) Moore.

Neurophyllum Presl, Hymen. 18, *pl. 4, f.C.* 1843, non Torr. & Gray (1840). Type: There were three original species: *Neurophyllum vittaria* (DC.) Presl, *N. pinnatum* (Hedw.) Presl, and *N. pennatum* (Kaulf.) Presl. Since *Neurophyllum* Presl was an illegitimate later homonym, van den Bosch in 1859 replaced it with *Neuromanes* Trevisan, which is thus to be considered as a renaming rather than a new genus and to be based on the same type. The original *Neuromanes* Trevisan [48] was based on different material and was not intended as a new name for *Neurophyllum* Presl, but it was a mere nomen nudum and therefore not validly published and need not be considered further. Christensen [49] chose *T. pinnatum* Hedw. as the type of his sect. *Neuromanes*, and placed sect. *Neurophyllum* as a synonym, and this effectively chose *T. pinnatum* as lectotype. Copeland's choice of *T. vittaria* DC. as lectotype must therefore be rejected; he evidently chose this

[48] Atti Ist. Veneto II, 2: 163. 1851.
[49] Ind. Fil. XIV. 1906.

species merely because it was the first one listed by Presl. This small group of species can be recognized as a distinct section. The fact that *Neurophyllum* is illegitimate as a generic name does not mean that it may not correctly be used as a sectional name, and since it has priority as a sectional name over *Neuromanes* it must be adopted.

Trichomanes sect. *Neurophyllum* (Presl) Moore, Ind. Fil. cx. 1857.
Neuromanes Trev. ex v. d. Bosch, Ned. Kruid. Arch. 4: 347. 1859. Based on *Neurophyllum* Presl (1843), not Torr. & Gray (1840).
Trichomanes sect. *Neuromanes* (Trev. ex v. d. Bosch) C. Chr. Ind. Fil. XIV. 1906. (Superfluous and illegitimate).

This small section contains only *Trichomanes pinnatum* Hedw., *N. pennatum* Kaulf., if that is distinguishable, and the simple-bladed *T. vittaria* DC. It is distinguished by the presence of dark false veins, perpendicular to the true veins.

Trichomanes sect. **19. Odontomanes** (Presl) C. Chr.

Odontomanes Presl, Epim. Bot. 20. 1849 [1851]. Type: The only original species was *Odontomanes hostmannianum* (Klotzsch) Presl=*Trichomanes hostmannianum* (Klotzsch) Kunze.
Neuromanes Trevisan, Atti Ist. Veneto II, 2: 163. 1851, nom. nud.
Trichomanes sect. *Odontomanes* (Presl) C. Chr. Ind. Fil. XIV. 1906.

This very small group is perhaps too close to sect. *Neurophyllum*, differing chiefly in the absence of false veins. In addition to *T. hostmannianum* it contains perhaps only *T. huberi* Christ and *T. laciniosum* Alston.

Trichomanes sect. **20. Lacostea** (v. d. Bosch) Christ.

Lacostea v. d. Bosch, Versl. Meded. Konink. Akad. Wetens. Afd. Natuurk. 11: 320. 1861. Type: Van den Bosch based his genus *Lacostea* on species 81 and 82 of his "Synopsis Hymenophyllacearum," namely *T. ankersii* Parker ex Hook. & Grev. and *T. brachypus* Kunze. Prantl (1875) recognized this group as a genus and included both of these species. Christensen in his "Index Filicum" gave two treatments of the group. On p. 634 in the body of the text (this part published July 2, 1906) he followed Prantl more or less and recognized *Lacostea* as a subgenus. In the preliminary pages of the "Index Filicum," published last (with a preface dated Sept. 15, 1906), he gave his own ideas of a suitable arrangement and here he recognized *Lacostea* as a section of his subg. *Cephalomanes*, citing *T. pedicellatum* Desv. as the type species, which was not one of the original species. However, this was in line with Christensen's practice of citing recognized species as the types. In the body of the text he refers *T. brachypus* Kunze to the synonymy of *T. pedicellatum*, and therefore really intended the type to be *T. brachypus* Kunze, now correctly called *T. pedicellatum*, a taxonomic synonym. This fixes the lectotype as *T. brachypus* Kunze. Copeland's choice [50] of *T. ankersii* Parker as type must therefore be rejected.
Lacostea sect. *Lacostea* Prantl, Untersuch. Morph. Gefässkrypt. 1: 50. 1875.
Trichomanes sect. *Lacostea* (v. d. Bosch) Christ, Farnkr. Erde 29. 1897 (erroneously attributed to v. d. Bosch).
Trichomanes subg. *Lacostea* (v. d. Bosch) C. Chr. Ind. Fil. 634. July 2, 1906.

[50] Phil. Journ. Sci. 67: 15. 1938.

Copeland did not recognize *Lacostea* either as a genus or section, but reduced it outright to his genus *Trichomanes*, my *Trichomanes* subg. *Achomanes*, but it seems to deserve recognition as a section. The species of *Lacostea*, all American, are probably only the following: *Trichomanes ankersii* Parker, *T. pedicellatum* Desv., *T. tanaicum* Baker, and *T. tuerckheimii* Christ.

Trichomanes sect. **21. Trigonophyllum** (Prantl) C. Chr.

Ptilophyllum sect. *Trigonophyllum* Prantl, Untersuch. Morph. Gefässkrypt. 1: 48. 1875. Type: There were two original species, *T. bancroftii* Hook. & Grev. and *T. bicorne* Hook. In selecting a type, Christensen [51] chose *T. arbuscula* Desv., not one of the original species, but considered by Christensen to be an older taxonomic synonym of *T. bancroftii* Hook. & Grev., which he reduced to synonymy. This fixes the lectotype as *T. bancroftii* Hook. & Grev.

Trichomanes sect. *Trigonophyllum* (Prantl) C. Chr. Ind. Fil. XV. 1906.

This small group perhaps still includes only the two species *T. arbuscula* Desv. and *T. bicorne* Hook., which do not appear to be especially closely allied.

Trichomanes sect. **22. Homoeotes** (Presl) C. Chr.

Homoeotes Presl, Abhandl. Boehm. Gesell. V, 5: 331. 1848. Type: *Trichomanes heterophyllum* Humb. & Bonpl. ex Willd., the sole original species.

Ptilophyllum sect. *Homoeotes* (Presl) Prantl, Untersuch. Morph. Gefässkrypt. 1: 48. 1875.

Trichomanes sect. *Homoeotes* (Presl) C. Chr. Ind. Fil. XIV. 1906.

This monotypic section differs from *Feea* and *Hymenostachis* primarily in having the rhizomes elongate and the fronds distichous. Two other species that have been considered allied are probably not referable here, *T. amazonicum* Christ and *T. spruceanum* Hook. Their proper position remains to be determined, perhaps as a subsection of *Feea*.

Trichomanes sect **23. Feea** (Bory) Christ

Feea Bory, Dict. Class. d'Hist. Nat. 6: 446. 1824. Lectotype: *Feea polypodina* Bory = *Trichomanes osmundoides* DC., taxonomically. There were two original species, *F. polypodina* and *F. nana* Bory. The first to choose a lectotype was apparently J. Smith,[52] who chose *Trichomanes spicatum* Hedw.—not one of the original species but was considered, doubt less rightly, a taxonomic synonym of *Feea polypodina* Bory by Presl. This fixes the lectotype as *F. polypodina*. In the "Index Filicum" (XIV. 1906) Christensen indicated the type as *Trichomanes botryoides* Kaulf., an impossible choice and not one of the original species. Copeland [53] erroneously indicated *F. nana* Bory as the type. In the "Genera Filicum" (1947), Copeland corrected this to *F. polypodina*.

Trichomanes subg. *Feea* (Bory) Hook. Sp. Fil. 1: 114. 1844.

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[51] Ind. Fil. XV. 1906.

[52] Hist. Fil. 349. 1875.

[53] Phil. Journ. Sci. 64: 13. 1937.

The section *Feea* is so close in its general morphology to the species of sect. *Achomanes* that is seems unnatural to segregate it as a distinct genus, as Copeland does solely on the basis of the dimorphism of the fronds. The section *Homoeotes* is perhaps a connecting link, for its leaves are only slightly dimorphic. The following two subsections may be recognized.

Trichomanes sect. **Feea** subsect. **Feea.**

Maschalosorus v. d. Bosch, Versl. Meded. Konink. Wetens. Afd. Natuurk. 11: 320. 1861. Type: *T. mougeotii* v. d. Bosch. = *T. osmundoides* DC., taxonomically.

Ptilophyllum sect. *Feea* (Bory) Prantl, Untersuch. Morph. Gefässkrypt. 1: 48. 1875. Prantl recognized *Feea* as a section and reduced *Hymenostachis* to a straight synonym; therefore, as sectional name *Feea* has priority.

Trichomanes sect. *Feea* (Bory) Christ, Farnkr. Erde 29. 1897 (erroneously attributed to Bory).

Trichomanes sect. *Maschalosorus* (v. d. Bosch) C. Chr. Ind. Fil. XIV. 1906.

The only species of subsect. *Feea*, which has free, stalked involucres, are *T. osmundoides* DC. and *T. botryoides* Kaulf.

Trichomanes sect. **Feea** subsect. **Hymenostachis** (Bory) Morton, comb. nov.

Hymenostachis Bory, Dict. Class. d'Hist. Nat. 6: 588. 1824. Type: *Trichomanes elegans* Rudge, the only original species = *Trichomanes diversifrons* (Bory) Mett.. The name *T. elegans* Rudge (1805) was a later homonym of *T. elegans* L. C. Rich. (1792). The name "*Hymenostachis*" has been altered by almost all later authors to "*Hymenostachys*" on orthographical grounds, but probably unjustifiably. Bory doubtless knew a good deal of Greek and deliberately chose to use the transliteration "-stachis."

Trichomanes subg. *Hymenostachis* (Bory) Hook. Sp. Fil. 1: 114. 1844. The first to unite *Feea* and *Hymenostachys* as subgenera was apparently Christensen,[54] who chose *Feea* and reduced *Hymenostachis* to a section, and therefore, for those who may wish to recognize *Feea* as a subgenus rather than a section, the correct name is subg. *Feea* (Bory) Hook.

In subsect. *Feea* the involucres are separated and somewhat stalked, and very little leaf-tissue is on the fertile fronds. The two known species of subsect. *Hymenostachis*, *T. diversifrons* (Bory) Mett. and *T. trollii* Bergd., have the fertile frond entire, about three cells thick, and with the involucres deeply and completely immersed in the leaf-tissue. The group has not been recognized as distinct recently but can conveniently be separated.

Trichomanes sect. **24, Ragatelus** (Presl) C. Chr.

Ragatelus Presl, Hymen. 14. 1843. Type: The type and sole original species is *Ragatelus crinitus* (Swartz) Presl = *Trichomanes crinitum* Swartz.

Ptilophyllum v. d. Bosch, Versl. Meded. Konink. Akad. Wetens. Afd. Natuurk. 11: 321. 1861. Type: As originally proposed, this genus included a large number of species, nos. 17 to 24 and 26 to 43 of van den Bosch's "Synopsis." Inasmuch as species 43, *Trichomanes crinitum* Swartz, had already received the generic name *Ragatelus* Presl in 1843, the name

[54] Ind. Fil. XIV. 1906.

Ptilophyllum was superfluous, since van den Bosch could have and should have used the prior name *Ragatelus*. Moreover, *Ptilophyllum* was later homonym of *Ptilophyllum* Reichenb. (1841) and thus doubly illegitimate. Nevertheless, Prantl adopted *Ptilophyllum*, reducing to synonymy such validly published earlier names as *Feea*, *Hymenostachis*, *Ragatelus*, and *Neuromanes*. In fact, Prantl even created a suprageneric group, the Ptilophylleae, but since this was called a "family" and yet was subordinated to a 'tribe" it is an invalid name, since the Code prohibits such changes in the relative order of categories, i.e., a family can be divided into tribes but a "tribe cannot be divided into families as Prantl tried to do. Since *Ptilophyllum* included the type of the previously published *Ragatelus* Presl, it must be considered as an illegitimate change of name for the latter and to have the same type, namely *Trichomanes crinitum* Swartz.

Trichomanes sect. *Ptilophyllum* (v. d. Bosch) Christ, Farnkr. Erde 27. 1897 (as to type, not as to concept).

Trichomanes subg. *Ptilophyllum* (v. d. Bosch) C. Chr. Ind. Fil. 634. 1906 (as to type, not as to concept).

Trichomanes sect. *Ragatelus* (Presl) C. Chr. Ind. Fil. XIV. 1906.

The genus *Ragatelus* was erected on the impression that the receptacle was bifid, which was an erroneous observation or else a casual teratological form. This does not, of course, invalidate the publication of the name. The species *T. crinitum* Swartz is rather distinctive and isolated and can tentatively be accepted as representing a monotypic section, as Christensen did. Copeland did not give it any recognition.

Trichomanes sect. **25. Acarpacrium** (Prantl) C. Chr.

Trichomanes subg. *Pseudachomanes* Presl, Epim. Bot. 16. 1849 [1851]. Type: Five species were originally assigned to this subgenus by Presl: *T. sinuosum* L. C. Richard, *T. cognatum* Presl, *T. holopterum* Kunze, *T. bancroftii* Hook. & Grev., and *T. alatum* Swartz. In the "Index Filicum," Christensen chose *T. polypodioides* L. as the type, which was not one of the original species, but considered by Christensen as a taxonomic synonym and the correct name for *T. sinuosum* L. C. Richard; therefore, the latter must be considered as having been designated as lectotype. The matter is of some importance, for the species listed originally by Presl are not really closely allied.

Ptilophyllum sect. *Achomanes* [subsect.] *Sinuosa* Prantl, Untersuch. Morph. Gefässkrypt. 1: 47. 1875. Lectotype: *Trichomanes sinuosum* L. C. Richard.

Ptilophyllum sect. *Acarpacrium* Prantl, Untersuch. Morph. Gefässkrypt. 1: 48. 1875. Type: There were six species referred originally to the section. Christensen in the "Index Filicum" chose *T. alatum* Swartz as the type, an impossible choice since this was not one of the original species, but this inferentially selects as lectotype *Trichomanes ptilodes* v. d. Bosch, the first named of the original species, which Christensen considered a taxonomic synonym of *T. alatum*.

Trichomanes sect. *Acarpacrium* (Prantl). C. Chr. Ind. Fil. XIV. 1906.

Trichomanes sect. *Pseudachomanes* (Presl) C. Chr. Ind. Fil. XIV. 1906.

This small group of species can be distinguished from sect. *Achomanes* by the presence of stellate (or at least bifid) hairs on the margins of the segments and also on the veins to some extent. It does not

appear necessary to distinguish between the merely pinnatifid species as sect. *Pseudachomanes*, such as *T. polypodioides* L. (syn. *T. sinuosum* L. C. Richard) and the more dissected species like *T. alatum* Swartz of sect. *Acarpacrium*, as Christensen did. The character of the rhizome hairs (termed "paleae" by Prantl) being straight in *T. sinuosum* and its allies and peltate in *T. crispum* L. and its allies of the section *Achomanes* needs further study; apparently this has received no attention since the time of Prantl. The number of species is uncertain; they include *Trichomanes adscendens* Kunze, *T. alatum* Swartz, *T. attenuatum* Hook., *T. curranii* Weath., *T. fimbriatum* Backh., *T. pinnatifidum* v. d. Bosch, *T. polypodioides* L., *T. ptilodes* v. d. Bosch, and *T. trigonum* Desv.

Unplaced Sectional Name

Trichomanes sect. Flabellata Presl, Hymen. 16. 1843.

Gonocormus sect. *Microtrichomanes* Mett. ex Prantl, Untersuch. Morph. Gefässkrypt. 1: 51. 1875.[55] Lectotype: *T. digitatum* Swartz (chosen by Christensen).

Trichomanes sect. *Microtrichomanes* (Mett. ex Prantl) C. Chr. Ind. Fil. XIV 1906.

Microtrichomanes (Mett. ex Prantl) Copel. Phil Journ. Sci. 67: 35. 1938.[56]

LECTOTYPE: *Trichomanes digitatum* Swartz.

This group "*Microtrichomanes*" has been one of the stumbling blocks in the recent classification of the family, because in some ways it seems to bridge the gap between *Trichomanes* and *Hymenophyllum* and does not fit into either comfortably; but this fact ought not influence our classification unduly. If it were a homogeneous group as delimited by Copeland, the species obviously more closely related to each other than to any others and to have had a common ancestry, then one would have some hope of placing it definitely in a system, in *Trichomanes*, in *Hymenophyllum*, or in a distinct genus intermediate between them. But this is not the case. It is decidedly heterogeneous and would seem to be polyphyletic. It may have arisen anciently from hybridization between various species of *Trichomanes* and *Hymenophyllum*, perhaps belonging to quite different groups, in which case it

[55] Mettenius proposed this previously (Abhandl. Math.-Phys. Class. König. Sächs. Gesell. Wiss. 7: 413. 1864) as "gruppe" *Micro-trichomanes*, but this cannot be considered a valid publication; since "gruppe" is not a recognized taxonomic category, it must be considered only an informal grouping. As members of the group Mettenius listed *T. digitatum* Swartz, *T. palmatifidum* C. Muell., and *T. dichotomum* Kunze; these same species were listed by Prantl when he recognized the section, along with two others, *T. nitidulum* v. d. Bosch and *T. flabellatum* v. d. Bosch. In recognizing this group as a section Christensen chose *T. digitatum* as lectotype.

[56] Holttum, Ferns Malaya 94. 1954, proposed *Trichomanes* subg. *Microtrichomanes*, but invalidly without the definite citation of the basionym.

would have little or no unity as a "hybrid genus," and would not really deserve separate generic status. Apparently most of the species can be accommodated in existing *Trichomanes* sections without undue problems, but they are too little known to me for me to make the attempt. The nine species referred here by Copeland are distributed from the East African Islands through Malaya, Malesia, and Polynesia to Australia, but they are everywhere rare. They should each be investigated morphologically from good fresh material and each one placed according to its merits, which is not something that is likely to be done in the near future.

The somewhat doubtful species (generically) referred here are: *T. aswijkii* Racib., *T. dichotomum* Kunze, *T. digitatum* Swartz, *T. flabellatum* v. d. Bosch, *T. francii* Christ, *T. lyallii* (Hook. f.) Hook., *T. nitidulum* v. d. Bosch, *T. palmatifidum* K. Muell. (*Hymenophyllum borneense* Hook.), *T. parvulum* Poir., *T. piliferum* van Alderw. van Rosenb., *T. ridleyi* Copel., *T. taeniatum* Copel., *T. vitiense* Baker, and *Microtrichomanes zamboanganum* Copel.

Rejected Names

Achomanes Necker, Elem. Bot. 3: 313. 1790.

Although often cited as a synonym of *Trichomanes* L., this name must be rejected as invalid, as are all of Necker's names according to Art. 20, Note 2, of the International Code of Botanical Nomenclature (1961 ed.).

Adiantopsis v. d. Bosch.

Christensen [57] and Copeland [58] cite this name as a synonym of *Davalliopsis* v. d. Bosch, but both without citing any place of publication. I have been unable to locate such a name among van den Bosch's works. If the name were published, it would be an illegitimate later homonym of *Adiantopsis* Fée (1852).

Boschia Copel. Phil. Journ. Sci. 64: 11. 1937.

A name not otherwise mentioned by Copeland, probably a provisional name that he intended to use (perhaps for *Mecodium*?) and later abandoned but overlooked here.

Hemiphlebium Presl, Hymen. 25, *pl. 9.* 1843. Type (the only original species): *Hemiphlebium pusillum* (Swartz) Presl = *Trichomanes pusillum* Swartz. Presl did have authentic type material of *T. pusillum* Swartz in hand. However, evidently one or more fronds of a different species were intermixed, which in Jamaica could only have been *T. hookeri* Presl, since Presl described and illustrated an intramarginal false vein, such as occurs in *T. hookeri* but not in *T. pusillum*. That the drawing was partly made from the true *T. pusillum*

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[57] Ind. Fil. XV. 1906.

[58] Gen. Hymen. 14. 1938.

is shown by the marginal stellate hairs, which occur in *pusillum* and not in *hookeri*. Since Presl's differentiation of this genus *Hemiphlebium* from *Didymoglossum* was primarily on the presence of this false vein and since such a false vein does not occur in the cited type, it seems that there is no alternative but to abandon *Hemiphlebium* as a *nomen confusum*. This seems to be the position taken by J. G. Wessels Boer in his recent "The New World Species of *Trichomanes* sect. *Didymoglossum* and *Microgonium*." [59]

Trichomanes sect. *Hemiphlebium* (Presl) Moore, Ind. Fil. cx. 1857.

Trichomanes subg. *Hemiphlebium* (Presl) Christ, Farnkr. Erde 23. 1897.

Trichomanes sect. *Euhemiphlebium* (Presl) Christ, Farnkr. Erde 23. 1897.

Trichomanes sect. *Eutrichomanes* [subsect.] *Hemiphlebium* (Presl) van Alderw. van Rosenb. Malay. Ferns 83. 1908.

The following names appear in Christ's "Farnkraüter der Erde" (1897) apparently intended as sections, but they are all nomina nuda, without descriptions: *Hymenophyllum* sect. *Ciliata, Crispata, Elastica, Exserta, Flabellata, Fuciformia, Pendula, Pilosa, Pinnatifida,* and *Polyantha*. In those instances where Christ has indicated that these names are adopted from Presl, Prantl, or van den Bosch, I have considered that these are validly proposed new combinations, where they differ from the original combination.

Some names, none original, appear in Sadebeck's treatment of the Hymenophyllaceae in Engler and Prantl's "Die Natürlichen Pflanzenfamilien," (1899) but without any indication of rank or any consistency in usage, some groups receiving names and others of coordinate rank without names. I have ignored these, since Sadebeck obviously did not intend to present a complete classification into subgenera, sections, and subsections but merely applied names to groups that had already received names by Presl or other previous authors, without designating or deciding on any rank.

Copeland in his paper on *Trichomanes* (Phil. Journ. Sci. 51: 131. 1933) used several new names: *Pyxidifera, Taschneria, Scandentia, Grandia, Apiifolia,* and *Rigida*; these were not considered either as subgenera or sections but were merely called "groups," which is not a recognized botanical category. I consider them as merely informal groupings and unpublished. Some of these same groups were indicated as sections by Alston in his key in the "Ferns and Fern-allies of West Tropical Africa" (1959) but without validating Latin descriptions or references to previously published descriptions, and these too are unpublished.

[59] Acta Bot. Neerl. 11: 277–330. 1962.

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By C. V. MORTON

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STUDIES OF FERN TYPES, II

C. V. Morton

This paper is the second and final part of C. V. Morton's general work on fern types. This work was accomplished in large part through grants from the John Guggenheim Memorial Foundation and the National Science Foundation (grants G–4080 and GB–1243). The first part, "Studies of Fern Types, I" (Contr. U.S. Nat. Herb. 38:29–83, 31 Aug. 1967), included an introduction that provides background for this paper as well; readers may wish to refer to it.

At the time of his death, in July 1972, Mr. Morton had all but completed the present paper. The work is entirely his, except for this introduction and some slight editorial changes that I made in assembling the manuscript for publication.—D. B. Lellinger.

1. Acrostichum neglectum F. M. Bailey, Trans. Linn. Soc. New South Wales 5:32. 1881. =**Bolbitis neglecta** (F. M. Bailey) Morton, comb. nov.
Leptochilus neglectus (F. M. Bailey) C. Chr. Ind. Fil. 14. 1905.
Type: Trinity Bay Ranges, Queensland, Australia, May, 1877, *F.M. Bailey* (isotype BM, Morton photograph 7357).

This species is very different in the cutting of the sterile blades from other Australian species of *Bolbitis*. Apparently it is endemic in Queensland, where it is rare.

2. Acrostichum obductum Kaulf. ex Spreng. *in* L. Syst. Veg. ed. 16, 4:34. 1827. =**Elaphoglossum lancifolium** (Desv.) Morton, Contr. U.S. Nat. Herb. 38:32. 1967.
Type: A renaming of *Acrostichum lancifolium* Desv., and thus based on the same type as that.

It is likely that Kaulfuss intended his *A. obductum* to be based on Mauritius, *Sieber*, Syn. Fil. no. 25, and it has been perhaps generally so considered, although never definitely lectotypified. But when Sprengel published the name he did not mention Sieber or indeed cite any specimens, merely citing *Acrostichum lancifolium* Desv. as a synonym. Since the name *A. lancifolium* was a legitimate and available name, there was no need to propose a different name, *A. obductum*. There is nothing in the original description to suggest that *A. lanci-*

folium was cited as a synonym with an implied query, and so by Art. 63 of the Code the name *A. obductum* must be considered superfluous, and by Art. 7 it must be typified on the basis of the type of the name that ought to have been adopted, thus on the type of *A. lancifolium*. For the plant identified as *Elaphoglossum obductum*, see under *Acrostichum tomentosum* Bory.

3. ACROSTICHUM TOMENTOSUM Bory ex Willd. *in* L. Sp. Pl. ed. 4, 5:101. 1810. **=Elaphoglossum tomentosum** (Bory) Christ, Farnkr. 37. 1897.

Acrostichum heterolepis Fée. Mém. Foug. 2:56, *t. 15, f. 1.* 1845. Based on Bourbon [Réunion], *Bory* and *Sieber*, Fl. Mix. 281 (probably also from Réunion). I do not choose to lectotypify it at present.

Elaphoglossum heterolepis (Fée) Moore, Ind. Fil. 10. 1857.

Elaphoglossum obductum sensu auctt. (e.g., Tardieu, Notul. Syst. 16:185. 1960), non *Acrostichum obductum* Kaulf. ex Spreng. See under *A. obductum.*

TYPE: Bourbon Island [=Réunion], *Bory.* In the Willdenow Herbarium in Berlin there is a single sheet (no. 19508) named *A. tomentosum*, this received from Flügge. I do not believe that Flügge ever collected in Réunion, but he is known to have exchanged plants widely; his specimen of *A. tomentosum* may well have come from Bory. The specimen in the Willdenow Herbarium is poor, just a detached frond, but it agrees well enough with Willdenow's description.

In Madame Tardieu's treatment of *Elaphoglossum* in Madagascar and the Mascarene Islands (Notul. Syst. 15:425–443. 1959), the species *Acrostichum tomentosum* Bory ex Willd. is not placed or mentioned except (p. 429) under *E. obductum* (Kaulf.) Moore, where a synonym is "*A. tomentosum* Bory in herb. (non Willd. Spec.)." If *A. tomentosum* Bory ex Willd is different from *obductum*, then it must be the same as one of the other species treated by Tardieu, since it is from Réunion, and it would very likely be the earliest and thus the correct name for one of them. But this does not seem likely, for there is no a priori reason to think that the Bory specimens in Paris labeled *A. tomentosum* are different from the species described by Willdenow. If they are indeed different, then the proper name for the plant called *E. obductum* by Madame Tardieu will be *E. heterolepis* (Fée) Moore.

4. ADIANTUM CUNEATUM var. ANGUSTIFOLIUM Mart. & Gal. Mém. Acad. Sci. Brux. 15:70. 1842 [as "*angustifolia*"]. **=Adiantum andicola** Liebm. Dansk. Vid. Selsk. Skrift. V, 1:266. 1849.

SYNTYPES: Mexico, *Galeotti* 6266 and 6359. Lectotype: Mount Orizaba, Veracruz, Mexico, 9,500 feet, *Galeotti* 6266 (BR, Morton photograph 5062). Although Martens and Galeotti cite only two numbers they indicate four localities.

Fournier (Mex. Pl. 128. 1872) did not mention var. *angustifolium* by name, but he cited *Galeotti* 6266 under *A. multiforme* A. Braun var. *β* and 6539 under *A. amabile* Liebm. *Adiantum multiforme* A. Braun ex Fourn. (Mex. Pl. 128. 1872) is essentially without a description as a species, although the two varieties are distinguished as var. *a*, pinnis

latioribus, inferioribus aliquando suborbicularibus, and var. β, pinnis angustioribus. Under var. α there are several synonyms, all "sensu" names except *A. extensum* Fée. At the places cited by Fournier (Fée, Gen. Fil. 119. 1852 and Mém. Foug. 9:6. 1857) this name is also a nomen nudum based on *Schaffner* 40 and 41, but the species was validly described in Mém. Foug. 8:72. 1857, based on *Schaffner* 40 and 41 from Orizaba and Huatusco, Veracruz. I do not choose one of these as lectotype at the moment, since I have not seen either specimen; however, *A. multiforme* A. Braun can be considered as validly published, a substitute name for *A. extensum* Fée. As such it is a superfluous and consequently illegitimate name which must be typified on the same types as *A. extensum*, namely *Schaffner* 40 and 41. Under var. β Fournier cited *A. mexicanum* Presl, Tent. Pterid. 158. 1836. From the entry in the "Index Filicum" it would appear that this is a validly published name, but apparently it is only a nomen nudum. Presl gave no description, only referring to *A. cuneatum* Schlecht. (non Langds. & Fisch.), by which he seemingly intended *A. cuneatum* sensu Schlecht. & Cham. Linnaea 5:615. 1830, but in Schlechtendal and Chamisso there is no word of description that might validate the name. Fournier cited also Mettenius, but I do not find any use of the name by Mettenius.

5. ADIANTUM TENERUM var. DISSECTUM Mart. & Gal. Mém. Acad. Sci. Brux. 15:71. 1842. =**Adiantum andicola** Liebm. Dansk. Vid. Selsk. Skrift. V, 1:266 (seors. 114). 1849.

TYPE: Oaxaca, Mexico, "terre froide," 8,000 ft. alt., *Galeotti* 6361 (holotype BR, Morton photograph 5063).

6. ASPIDUM BRACHIATUM Zoll. & Moritzi. Natuur Geneesk. Arch. Neerl. Indië 1:399. 1844. =**Tectaria brachiata** (Zoll. & Moritzi) Morton, comb. nov.

Aspidium zollingerianum Kunze. Bot. Zeit. 4:462. 1846. Syntypes: Java, *Zollinger* 655, 655A. The specimens of these numbers in Geneva (Morton photographs 3803 and 3804 respectively) have the names in Kunze's hand, and are undoubtedly the syntypes. No. 655 is here chosen lectotype, since it is the larger and more mature specimen. The labels of the Geneva specimens lack specific locality data, and consequently Kunze did not cite this. A duplicate of no. 655 in Leiden gives the locality as on calcareous rocks on stream banks near Tjikoya, Java, i.e., the same locality as *A. brachiatum*.

Aspidium variolosum Wall. ex Hook. Sp. Fil. 4:51. 1862. Syntypes: Hooker cites seven syntypes, but since the name is adopted from Wallich, Num. List no. 379. 1829 (nom. nud.) and is attributed to Wallich, one of the collections under Wallich Cat. 379 must be the lectotype. Hooker, however, cited three localities for no. 379, namely Amherst, Tavoy, and Penang. Ching (Sinensia 2:21. 1931) indicated Wallich 379 as "type" (i.e., lectotype) and illustrated it in his Plate III, presumably from a specimen in the Kew Herbarium. This plate ought to be matched up with the Kew specimens to determine the type locality.

Tectaria variolosa (Wall. ex Hook.) C. Chr., Contr. U. S. Nat. Herb. 26:289. 1931.

TYPE: "In calcareo-argillosis ad ripas rivulorum prope Tjikoya prov. Batav., raro," Java, *Zollinger*. These data correspond to *Zollinger* 655 and 655A, the same numbers that *A. zollingerianum* Kunze was based on.

Since the publication of Zollinger and Moritzi is rare, at least outside of Dutch libraries, I give below the original description:

Fronde heteromorpha membranacea glabriuscula margine ciliolata ternata, foliolis lateralibus bipartitis cordatis, laciniis acuminatis, medio 3-partito, laciniis lateralibus sessilibus, mediali elongato-acuminata pinnatifida; frondibus fertilibus longe stipitatis frondibus sterilibus similibus sed omnibus partibus elongato-angustatis, soris majusculis subseriatis, stipite glabriusculo.

Filis vix pedalis. Folioli lateralis pars superior inferiore longior subpinnatifida; folioli medii laciniae laterales subfalcatae. Venulae subtus hirsutulae.

Stipes frondis sterilis minus elatus; fertilis folioli breviter petiolati. Sori venularum ramulos superiores terminantes.

It is too bad that the rather well-known name *Tectaria variolosa* must be abandoned, but there seems no help for it.

In publishing *Aspidium variolosum* for Wallich, Hooker completely overlooked the earlier species *A. brachiatum* and *A. zollingerianum*. Moore, who was adept in picking up overlooked names, listed *A. brachiatum* as a doubtful species, with *A. zollingerianum* as a synonym. Christensen in the "Index Filicum" also recognized *brachiatum* as a valid species. Ching in his "A Revision of the Genus Tectaria from China and Sikkime-Himalaya" (Sinensia 2:9–36. 1931) adopted *T. variolosa* (Wall. ex Hook.) C. Chr. and reduced both *A. brachiatum* and *A. zollingerianum* to synonymy, even though these were earlier names. This is perhaps explained by the fact that he attributes (twice on page 21) the date "1826" to volume 4 of Hooker's "Species Filicum," whereas the correct date is really 1862. Holttum, in his "Ferns of Malaya" (p. 506. 1954), recognized *T. variolosa*, and commented on its occurrence in Java, but also overlooked the earlier names *brachiatum* and *zollingerianum*.

7. ASPIDIUM IMMERSUM Blume, Enum. Pl. Jav. 2:156. 1828. =**Thelypteris immersa** (Blume) Morton, comb. nov.
   Lastrea immersa Moore, Ind. Fil. LXXXIX. 1857.
   Nephrodium immersum Hook. Sp. Fil. 4:112. 1862.
   Dryopteris immersa Kuntze, Rev. Gen. Pl. 2:813. 1891.
   Dryopteris besukiensis f. *laxiloba* van Alderw. van Rosenb. Bull. Jard. Bot. Buit. II, 1:8. 1911. Type: Besoeki Idjen, Java, *Koorders* 15436 B (isotype or syntype L, Morton photograph 1064).
   Dryopteris besukiensis f. *confertiloba* van Alderw. van Rosenb. loc. cit. Type: Besoeki Idjen, Java, *Koorders* 19830 B (isotype or syntype L, Morton photograph 1064).
   TYPE: Gaenaeng Parang, Java, *Blume* (holotype L, Morton photograph 1164).

This species has been reported also from Borneo, New Guinea, and the Philippine Islands, but its real range remains to be determined. My

notes on the type are: Veins oblique, bearing yellow glands beneath and no long hairs; indusia flat, glabrous, persistent.

8. ASPIDIUM MEXICANUM var. SERRATUM Mett. Abhandl. Senckenb. Naturf. Gesell. 2:349. 1858. =**Dryopteris patula var. serrata** (Mett.) Morton, comb. nov.

Aspidium chaerophylloides Moritz ex Mett. loc. cit. pro syn.

Dryopteris patula var. *chaerophylloides* C. Chr. Dansk. Vid. Selsk. Skrift. VII, 10:71. 1913.

TYPE: Caracas, Venezuela, *Moritz* 435. The holotype is presumably in the Mettenius Herbarium in Berlin. I have seen a specimen labeled *Aspidium chaerophylloides* Moritz but bearing the number Moritz 434 (Leiden, Morton photographs 1087, 1088). It seems likely that this is an isotype, and that it bears the wrong number "434" or that Mettenius erred in citing the number originally as "435."

Christensen in describing *Dryopteris patula* var. *chaerophylloides* credited the epithet to "Bak. Syn. 276," but this is an error. Baker never used the generic name *Dryopteris;* he had this plant as "*Nephrodium mexicanum* β *A. chaerophylloides* Moritz" (Hook. & Bak. Syn. Fil. 276. 1868), an illegitimate combination, using a binomial for a variety. Moreover, var. *serratum* has a clear priority of ten years. The taxonomic validity of this eglandular variety needs further investigation, as do the forms of this variable species generally.

9. ASPIDIUM ULIGINOSUM Kunze, Linnaea 20:6. 1847. =**Thelypteris torresiana** (Gaud.) Alston, Lilloa 30:111. 1960.

LECTOTYPE: Described from cultivated specimens in the botanical garden in Leipzig, which Kunze had received from the botanical garden in Bonn. Since Kunze's herbarium in Leipzig was destroyed, there is no holotype extant. So far as I know, no lectotype has been designated. There is a specimen (Morton photograph 19739) in the Jardin Botanique National de Belgique, Brussels, from the botanical garden in Leipzig with the notation that the plant was originally from Java; this specimen is identified in Kunze's own hand as "*Aspidium uliginosum* mihi," and is thus fully authentic; I therefore designate it as lectotype.

The above lectotype is quite the same as the species treated by Holttum (Blumea 17:27. 1969) as *Macrothelypteris torresiana* (Gaud.) Ching.

10. **Asplenium adiantum-nigrum** var. **capense** Schlecht. Adumbratio 31, 32, *t. 17.* 1825–32.

Sometimes, as in Kuhn's "Filices Africanae," a "var. *capense* Schlecht." is cited as though validly published, and the name appears also on some herbarium labels. Schlechtendal mentioned that *Asplenium adiantum-nigrum* occurs in two varieties, one with acute segments in the Canary Islands, Italy, and Porto Rico, the other with obtuse segments in the Cape of Good Hope and Germany. He did not actually propose varietal names for these, however, nor did he indi-

cate which, if either, included the type of *A. adiantum-nigrum* L. The name "*capense*" occurring only on the plate and the explanation of the plate merely indicates material drawn from plants collected in the Cape region and is not a formal naming of a variety.

11. ASPLENIUM CAUDATUM var. SECTUM Hillebr. Fl. Haw. 603. 1888. =**Asplenium polyodon var. sectum** (Hillebr.) Morton, comb. nov.
Asplenium sectum (Hillebr.) Copel. Phil. Journ. Sci. 9:439. 1914.
Asplenium falcatum var. *sectum* (Hillebr.) Skottsb. Acta. Hort. Gotob. 15:101. 1942.

SYNTYPES: Haleakala, Maui, Hawaii, *Hillebrand* and Oahu, Hawaii, *Hillebrand*. The former collection from Haleakala, right-hand frond, is here designated lectotype (B, Morton photograph 9666).

This is a form with long-attenuate pinnae, these prominently lobed at the base only or nearly throughout. Skottsberg recognized three or four forms.

12. **Asplenium decipiens** Zippel ex Kunze, Bot. Zeit. 6:193. 1848, in adnot.
TYPE: Java, *Kollmann* (not seen).

I am calling attention to this species because the name is overlooked in the "Index Filicum" and its supplements. Although mentioned in a note only, it is accepted as new by Kunze and given sufficient description to validate it, namely that the caudex is flexuous and glabrous and the blade irregularly incised-dentate. Kunze indicates that this might be a *Diplazium*, but this does not of course invalidate the name, which is definitely indicated as *Asplenium decipiens* Zippel. The matter is of some importance because this name antedates *Asplenium decipiens* Mett. (1859) and *A. decipiens* Kuhn (1879). Backer and Posthumus (Varenfl. Java 126. 1939) place *A. decipiens* Zippel as a synonym of *Diplazium subserratum* (Blume) Moore.

13. ASPLENIUM DENTICULATUM Blume, Enum. Pl. Jav. 186. 1828. =**Asplenium aethiopicum** (Burm. f.) Becherer, Candollea 6:23. 1935, forma.
TYPE: Java, *Blume* (holotype L, Morton photograph 527). The type is mounted on a sheet with four other Blume types. All the labels, in Blume's own hand, are grouped on the right-hand margin of the sheet, and there is no indication as to which label goes with which plant. The other types are *Asplenium tripartitum* Blume, *A. furcatum* var. *fissulum* Blume, *A. furcatum* var. *fragrans* Blume, and *A. furcatum* var. *depauperatum* Blume. I have compared these plants with Blume's descriptions, and I was able to decide on the various types with some degree of certainty. The large central plant is *A. furcatum* var. *fissulum*. The plant at the lower left is *A. tripartitum;* the plant at the upper right is *A. furcatum* var. *fragans*. The small fragment at the bottom center is *A. furcatum* var. *depauperatum*. And the plant at the lower right is the type of *A. denticulatum*.

In the "Index Filicum," *Asplenium denticulatum* Blume is listed in italics as a dubious species. In Backer and Posthumus' "Varenflora

voor Java" (1939), it is placed as possibly the same as *Asplenium stereophyllum* Kunze (Bot. Zeit. 6:175. 1848), in which case it would be the prior and correct name. I have seen the type of *A. stereophyllum* (Java, *Zollinger* 2249, holotype G, Morton photograph 3811; isotype FI-Webb!). The Zollinger collections from Java that Kunze described were evidently lent to Kunze from Geneva, for they have the annotations in Kunze's own hand and the data as published by Kunze; they are thus indeed holotypes, which is fortunate since Kunze's own herbarium was destroyed during World War II. This holotype shows that *A. stereophyllum* has been correctly interpreted in the naming of recent collections. The pinnae are strongly unequal-sided, the lower side being cut away to about the middle of the pinnae and so it has fewer segments than the upper side. *Asplenium denticulatum* Blume is by no means this species but is only a form of the widespread, pantropic *A. aethiopicum*, not unlike some of the American forms that are called *A. praemorsum* Swartz. In fact, all of the types on this sheet (*A. tripartitum* and the varieties of *A. furcatum*) are referable to *A. aethiopicum* in a broad sense, which is evidently just as variable in Java as it is elsewhere.

14. Asplenium distans Fée, Gen. Fil. 198. 1852, non D. Don, 1825. =Diplazium camptocarpon Fée, Mém. Foug. 8:84. 1857.

Type: Oaxaca, Mexico, *Galeotti* 6529 (isotype P, Morton photograph 4165). Fée wrongly gave the number as 6579, which was corrected by Fournier to 6529

The holotype, with the name in Fée's hand, has not been found, but the isotype seen agrees with the description and is surely authentic. In the "Index Filicum," *Asplenium distans* Fée is considered a dubious species of *Asplenium;* however, the isotype shows that it is not an *Asplenium*, but a large, bipinnate (almost subtripinnate at base) *Diplazium*. It is very likely the same as *D. camptocarpon* Fée, the type of which is from Córdoba, Veracruz, Mexico, *A. Nieto* (*Schaffner* 69, not seen), a species that is similar at least to the more divided forms of *D. franconis* Liebm.

15. Asplenium falcatum var. subcaudatum Skottsb. Acta Hort. Gotob. 15:100. 1942. =Asplenium polyodon var. subcaudatum (Skottsb.) Morton, comb. nov.

Type: Nuuanu-Kalihi Ridge, Koolau Mountains, Oahu, Hawaii, *Skottsberg* 146 (not seen).

This variety includes the plants referred to *A. caudatum* Forst. in Hillebrand's "Flora of the Hawaiian Islands." Skottsberg, after an exhaustive study of the variation in *Asplenium falcatum* Lam. and its allies, excluded *A. caudatum* from the Hawaiian Islands, most of the variations being proposed as varieties of *A. falcatum*. As I indicated

in my earlier paper on fern types (Contr. U.S. Nat. Herb. 38:39–41. 1967), *Asplenium falcatum* Lam. was a superfluous and illegitimate name. The earliest correct name for this species is *A. polyodon* Forst., and consequently the various Hawaiian varieties are here transferred to that species (see also *A. knudsenii*, *A. nitidulum*, and *A. caudatum* var. *sectum*).

16. ASPLENIUM GRACILE. D. Don, Prodr. Fl. Nepal. 8. 1825. =**Athyrium setiferum** C. Chr. Ind. Fil. 146. 1905. Based on *Asplenium tenellum* Hope, non Roxb.[1]

Allantodia tenella Wallich, mss. Based on Nepal, *Wallich*.

Asplenium tenellum Hope, Journ. Bombay Nat. Hist. Soc. 22:529, t. 4. 1899. non Roxb. 1816, nec Fée, 1852. Lectotype: Cori Valley, above Bugdiar, Kumaon, India, 9,000 feet alt., *R. W. MacLeon* in 1893 (BM, Morton photograph 6980).

TYPE: "Hab. in summis alpibus reg. Himalayae dict. Nepaliae," *Wallich* (holotype BM, Morton photograph 6986, four right-hand plants; the left-hand plant on this sheet is also Nepal, *Wallich*, but was probably added later after the time of Don).

Asplenium gracile D. Don is considered in the "Index Filicum" as possibly the same as *Athyrium nigripes* (Blume) Moore (type from Mount Burangrang, Java, *Blume*, L, Morton photograph 665); there is some resemblance, but I do not believe that they are quite the same. On the other hand, it does seem clear that *A. gracile* is the same as *Athyrium setiferum* C. Chr., which is of course a later name. There is already an *Athyrium gracile* Fourn. (1872), however, and so Don's epithet may not now be transferred to *Athyrium*. Hope did not designate a type and cited many syntypes. He evidently chose the epithet "*tenellum*" from the cited synonym *Allantodia tenella* Wallich, which is a manuscript name only, not even appearing in Wallich's "Numerical List." It would thus seem that a Wallich specimen ought to be the lectotype, but Hope specifically indicated that the Wallich specimen represented a variant, thus making it ineligible as a lectotype. The specimen chosen above as lectotype seems to be a normal and typical specimen of Hope's concept. I have seen several other syntypes also, not all of which seem identical; in particular, the Mackinnon specimen from Sowarna Nala, Dehra Dun District, is larger and more divided and may not belong here at all, at least so far as the left-hand plant on the sheet in the British Museum (Natural History) is concerned; the specimen on the right may be rather typical (Morton photograph 6982). These Athyriums of the *filix-femina* group in the Himalayas are extremely perplexing and much confused in herbaria. There are probably too many names proposed for them.

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[1] Christensen wrongly cites *Allantodia tenella* Wallich as the basionym, but this was a manuscript name only and so cannot be a basionym.

17. ASPLENIUM GRACILESCENS Mett. Ann. Sci. Nat. V, 2:237. 1864. =**Diplazium gracilescens** (Mett.) C. Chr. Ind. Fil. 233. 1905.

SYNTYPES: Ocaña, Colombia, *Engel* 250 (isotype BM, Morton photograph 7073A), *Schlim* 69 (isotype L, Morton photograph 931). Since I have not seen the original syntypes in Berlin, I do not choose a lectotype.

In the "Index Filicum," the authority for the name *D. gracilescens* is given as "Moore, Ind. Fil. 329. 1861," but the name was a nomen nudum at this place. Since the species was not described until 1864, a new combination of the epithet under *Diplazium* could not be validly published three years previously in 1861. Therefore, Christensen must be cited as the author.

18. **Asplenium gueinzianum** Mett. ex Kuhn, Fil. Afr. 102. 1868.

Asplenium caespitosum Wallich, Num. List. no. 217. 1829, nom. nud., non Blume, 1828.

Asplenium laciniatum sensu Hook. Sp. Fil. 3:164. 1860, non D. Don.

TYPE: Port Natal, South Africa, *Gueinzius* (holotype B, Morton photograph 9714).

Hieronymus stated (Hedwigia 61:34. 1919) that this South African species was not distinct from the Himalayan plant that he called *A. laciniatum*, and he was probably right, for the holotype of *A. gueinzianum* does look indistinguishable from *Wallich* 217, the basis of the unpublished *A. caespitosum* Wallich (non Blume).

19. ASPLENIUM HAHNII Fourn. Mex. Pl. 109. 1872. =**Diplazium camptocarpon** Fée, Mém. Foug. 8:24. 1857.

TYPE: Escamela, near Orizaba, Veracruz, Mexico, Aug. 2, 1865, *Hahn* (holotype P, Morton photograph 4087).

Diplazium hahnii (Fourn.) C. Chr. Ind. Fil. 233. 1905.

The type is very similar to that of *A. distans* Fée (non D. Don); it seems to agree with the description of *Diplazium camptocarpon* Fée.

20. ASPLENIUM JAPONICUM var. CHATTAGRAMMICUM Clarke, Trans. Linn. Soc. II, Bot. 1:499. 1880. =**Diplazium chattagrammicum** (Clarke) Ching, Lingnan Sci. Journ. 15:277. 1936.

TYPE: Clarke cited merely Kasalong, Chittagong, India. Ching indicated the type to be at Kew, but did not designate a specimen. There are four specimens of Clarke's collecting from Kasalong, all much alike and agreeing with Clarke's description, but none of them is named var. *chattagrammicum*. Three are named merely *Asplenium japonicum*, and one *Asplenium japonicum* var. *elongata* (an unpublished name). Since the latter specimen agrees with the original description, it seems that Clarke first intended to call this plant var. *elongata* and changed it ultimately to var. *chattagrammicum*. Therefore, I take this sheet, the first collected, to be the lectotype of var. *chattagrammicum:* Kasalong, Chittagong, Jan. 10, 1869, *Clarke* 8254 (K, Morton photograph 18917). The other specimens that I believe to represent var. *chattagrammicum* also are from the same locality, but with later dates—*Clarke* 19074D, 19740A (this sheet bearing an annotation slip by Ching), and 19818.

Diplazium japonicum has recently been segregated as a distinct genus, *Athyriopsis* Ching (Acta Phytotax. Sinica 9:63. 1964), and as *Lunathyrium* Koidz. sect. *Athyriopsis* (Ching) Ohba (Sci. Rep. Yokosuka City Mus. 11:52. 1965). It is said to differ from *Diplazium* in having the lateral ridges of the rhachis above continuous and not open at the junction of the pinnae, and the prothallia with papillae on the margin and on the surface near the growing point. Rhachis characters are important, but especially for bipinnate or tripinnate plants. Simply pinnate-pinnatifid plants like *D. japonicum* do not show very different rhachis characters. Characters of the prothallia may indeed offer substantiating characters in segregating groups, but they are not useful as key characters, and in any case only a relatively few of the species of *Diplazium* have been studied from this viewpoint. The generic status needs to be investigated further.

21. Asplenium knudsenii Hillebr. Fl. Haw. 601. 1888. =**Asplenium polyodon** var. **knudsenii** (Hillebr.) Morton, comb. nov.

Type: Waimea, Kauai, Hawaii, *Knudsen*. A specimen bearing this name and data is not in the Hillebrand Herbarium in Berlin; however, there are two specimens from Kauai in the Hillebrand numbered 125 and 144 and named *A. knudsenii*. These may well be and probably are the types. The left-hand frond numbered 125 is here designated lectotype (Morton photograph 9677).

This variety represents the least cut form of *A. polyodon* found in the Hawaiian Islands. It is finely doubly serrate, but not at all lobed.

22. **Asplenium laciniatum** D. Don, Prodr. Fl. Nepal. 8. 1825.
Asplenium varians Hook. & Grev. Icon. Fil. 2: *t. 178*. 1830. Type: Nepal, common name "Dawecow," *Wallich* (holotype K or possibly E, not seen).

Type: "In alpibus," Nepal, *Wallich* (holotype BM, Morton photograph 6686).

It is indeed unfortunate that the application of the name *A. laciniatum* D. Don must be changed, but I see no alternative. The name has been applied, following Hooker, to a rather characteristic plant of Nepal and the Himalayas (and elsewhere) that is allied to *A. planicaule* Wallich, but Hooker did not explain how he determined the identity of Don's species. There is in the British Museum (Natural History) a sheet containing a number of plants, indicated as "1," "2," and "3." Those at the top of the sheet (and the one in the right bottom corner) were collected on the banks of the Rapty River by Wallich in 1820; these are not types. The three plants numbered "2" are on the left center and are from Nepal collected by Wallich in December, 1817, and the common name in Nepal is given as "Dawecow"; these data are the same as those given by Hooker and Greville for their *Asplenium varians* except that they give the date as January, 1818; the specimens agree with Hooker and Greville's figure. The three specimens at right

center and the one center bottom are numbered "3," and they quite agree with each other; these are labeled, I think in Don's hand, "*laciniatum*" and "in Nepalia alphibus, D. Don Prod."; these specimens are indeed clearly the holotype, for they not only have Don's name and data but agree with Don's description, so far as that goes.

Don described his plants as only three to four inches long and the blades thin ("tenerae"), characters that clearly agree with the plants on this sheet labeled *laciniatum*, for these are small plants of thin texture. The plant described by Hooker as *laciniatum* is much larger, the stipes alone being stated by Hooker to be four to six inches, and the blades a span to a foot long, i.e., about nine to twelve inches; the texture is thick, and the species itself belongs to a different section of *Asplenium*, viz. sect. *Sphenopteris*. On the other hand, the true *A. laciniatum* is identical with the plants described as *A. varians* Hook. & Grev., and they probably came from the same Wallich gathering in either December, 1817, or January, 1818. Unfortunately, Hieronymus (Hedwigia 61:33. 1919), in discussing the differences between *A. laciniatum* D. Don and *A. planicaule* Wallich, followed Hooker's concept, apparently without any doubt about the matter, but he must not have looked carefully at Don's description or tried to locate Don's type in the British Museum (Natural History). The plant that has been wrongly called *A. laciniatum* is best called, at least tentatively, *Asplenium gueinzianum* Mett. (see entry No. 18).

23. Asplenium laserpitiifolium sensu D. Don, Prodr. Fl. Nepal. 9. 1825, non Lam., 1786.

AUTHENTIC MATERIAL: Chitlong, Nepal, April 11, 1802, *Buchanan-Hamilton* (BM, Morton photograph 6678).

This sheet has been marked by someone (Gepp?) as the type of "*Asplenium laserpitiifolium* (Hamilton) Don," and the label does say "*Asplenium laserpitiifolium* B.," the "B" evidently standing for "Buchanan." When Don published the name in his "Prodromus," however, he attributed the name to Lamarck, and so there is no "*A. laserpitiifolium* Buch.-Ham." even though this name appears in the "Index Filicum" and this sheet is marked as the type. This authentic specimen was first identified as *A. bulbiferum* Forst. f., to which it was attributed in the "Index Filicum," but it can hardly be that, although it does resemble it from my photograph, since the true *A. bulbiferum* grows in New Zealand and perhaps in New Caledonia, but nowhere in Asia. Someone has crossed out *bulbiferum* and written *bullatum* Wallich, which possibly is correct, although I doubt it. The matter is not of importance, however, since this is a "sensu" name only, a misidentification, and it does not have to be placed

at all, although it should be identified correctly in a definitive treatment of the ferns of Nepal.

24. ASPLENIUM LONGIFOLIUM D. Don, Prodr. Fl. Nepal. 7. 1825, non Schrad., 1824.
=**Diplazium longifolium** Moore, Ind. Fil. 151. July, 1859.
Asplenium lobulosum Wallich, Num. List. no. 210. 1829, nom. nud.; Mett. Abhandl. Senckenb. Naturf. Gessell. 3:207. Sept. 1859. Type: Nepal, 1821, *Wallich* (isotype BR, Morton photograph 21170, left-hand plant).
Diplazium lobulosum (Wallich ex Mett.) C. Chr. Ind. Fil. 234. 1905 (wrongly attributed to Presl).
TYPE: Based on Nepal, *Wallich*. A specimen that is doubtless an isotype is in Brussels (Morton photograph 21170, right-hand plant); this was received from the Lambert Herbarium (where Don was curator) in 1826.

The name *Diplazium lobulosum* has been generally adopted since the publication of the "Index Filicum," since the first name applied to the species, *Asplenium longifolium* D. Don, was an illegitimate later homonym. By the Code (Art. 72, Note), however, Moore's name *Diplazium longifolium* must be considered as a new name for *A. longifolium* D. Don (1825), non Schrader (1824), rather than as a transfer. Since Moore's name dates from July, 1859, it is earlier than the synonymous name *Asplenium lobulosum* Wallich ex Mettenius, which according to Stearn was published in September, 1859. The epithet *longifolium* thus has a priority of two months.

25. ASPLENIUM NITIDULUM Hillebr. Fl. Haw. 601. 1888. =**Asplenium polydon** var. **nitidulum** (Hillebr.) Morton, comb. nov.
Asplenium falcatum var. *nitidulum* (Hillebr.) Skottsb. Acta Hort. Gotob. 15:101. 1942.
SYNTYPES: Kauapali, Maui, Hawaii, *Hillebrand* (B, Morton photograph 9676); hills near Hilo, Hawaii, Hillebrand. The first of these is the lectotype.

This is a form that is just a little more cut than var. *knudsenii*, the pinnæ being short and broad, mostly with an evident superior basal lobe.

26. **Asplenium normale** D. Don, Prodr. Fl. Nepal. 7. 1825.
Asplenium unilaterale Buch.-Ham. mss. ex D. Don, loc. cit. in syn.
Asplenium multijugum Wallich, Num. List. no. 207. 1829, nom. nud.
Asplenium multijugum Wallich ex Mett. Abhandl. Senckenb. Naturf. Gesell. 3:179. 1859. Syntypes: India orientalis, *Wallich* 207 (dupl. US) and Ceylon, *Gardner* 25. The Wallich specimen is here designated lectotype.
TYPE: Narainhetty, Nepal, *Buchanan-Hamilton* (holotype BM, Morton photograph 6675)

The type is a good specimen, complete with rhizome, representing *Asplenium normale* in its usual sense. *Asplenium multijugum* Wallich is identical; Wallich ignored the name *A. normale* D. Don.

27. ASPLENIUM OBTUSILOBUM Desv. Mag. Naturf. Freund. Berlin 5:323. 1811.
=**Asplenium affine** Swartz. Journ. Bot. Schrad. 1800(2) : 56. 1802.

TYPE: Bourbon Island [Réunion], collector unknown (holotype P, Herb. Desvaux, Morton photograph 4161).

In the "Index Filicum," *Asplenium obtusilobum* is referred to the West Indian *A. cuneatum* Lam. (holotype P, Herb. Jessieu Cat. 1255, Morton photograph 3033, the locality and collector unknown). This disposition was accepted by Weatherby in his paper on the Desvaux fern types (Contr. Gray Herb. 114:21. 1936), probably on the basis that someone has written on the type sheet "Habitat in America calidiore," although pointing out that it differs somewhat from typical *A. cuneatum*. Actually the type does not match any American material, but it does match specimens from Réunion and Mauritius of *A. affine* Swartz (type not stated in original publication, but given later by Swartz, Syn. Fil. 84, 279. 1806, as Mauritius, *Groendal;* holotype S-PA, Herb. Swartz, Morton photographs 5770, 5771). Therefore, Desvaux' original ascription of the species to Bourbon was correct and the locality of tropical America on the type sheet is wrong. *Asplenium affine* is similar to *A. cuneatum*, but obviously it is different in having the ultimate segments trapezoidal and bluntly toothed or lobed, whereas those of *A. cuneatum* are obovate and sharply toothed. The Old World specimens, mostly from the South Pacific, that have been identified as *A. cuneatum* are probably referable to *A. affine* or other allied species.

28. ASPLENIUM PLANICAULE Wallich ex Mett. Abhandl. Senckenb. Naturf. Gesell. 3:201. 1859, non Lowe, 1858. =**Asplenium yoshinagae** var. **planicaule** Morton, nom. nov.

Asplenium planicaule Wallich, Num. List. 8, no. 189. 1829, nom. nud.

Asplenium truncatum D. Don ex K. B. Presl, Tent. Pterid. 107. 1836, nom. nud. A new name for *A. planicaule* Wallich, nom. nud. Authentic material: Nepal, *Wallich* (BM, Morton photograph 6670; B, Morton photograph 9737).

Tarachia truncata K. B. Presl, Epim. Bot. 78. 1849 [1851], nom. nud.

Asplenium indicum Sledge, Bull. Brit. Mus. (Nat. Hist.) Bot. 3:264. 1965. A new name for *Asplenium planicaule* Wallich ex Mett., non Lowe.

TYPE: Based on *A. planicaule* Wallich ex Mett., non Lowe. The syntypes are Himalaya Mountains, *Wallich* no. 189 and *Fielding*. The name *planicaule* originated with Wallich and so the Wallich specimen no. 189 in Berlin ex Herb. Mettenius is here designated lectotype (Morton photograph 9739, a sheet with a detached frond at the left, and two fronds with a rhizome at the right, and a label saying "Typus"; there are other sheets of *Wallich* 189 at Berlin, all of them also with the label "Typus").

Sledge noted that the well-known name *Asplenium planicaule* Wallich ex Mett. (1859) was a later homonym of *A. planicaule* Lowe (1858) and so proposed the new name *A. indicum*, remarking that a

variety grew in Japan. He overlooked the fact that the Japanese variety had been originally proposed as a species, *Asplenium yoshinagae* Makino (1900). So long as these are considered as only varietally different, which appears to be best, the name *A. yoshinagae* has priority as a species name for the combined species, and Sledge's name *A. indicum* is unnecessary. The Japanese plant has been called *A. planicaule* var. *yoshinagae* (Makino) Tagawa (Acta Phytotax. Geobot. 14:95. 1951), but now this variety must become the species and the species the variety. Even though *A. planicaule* Wallich ex Mett. is not correct as a species name, the epithet *planicaule* is available as a varietal name and is therefore adopted here. Sledge cited as a synonym *Asplenium falcatum* var. *abbreviatum* Kunze (Linnæa 24:260. 1851), and so it might appear that *abbreviatum* is the earliest varietal epithet, but an examination of Kunze's publication shows that Sledge misinterpreted Kunze's intention, for Kunze clearly indicated that his names at this place were forms. Since epithets have priority only within their category, it is not necessary to raise Kunze's forma *abbreviatum* to varietal status, and I do not do so because I am not absolutely convinced that the name really refers to this plant. Kunze's original type specimens were destroyed in Leipzig and so his plant cannot really be definitely identified; the f. *abbreviatum* was based on plants from the Niligiri Mountains (*Schmid-Koch* 49 and 132; duplicates may exist elsewhere).

29. **Asplenum riedelianum Bongard ex Kuhn, Linnaea 36:102. 1869. =Diplazium riedelianum (Bongard ex Kuhn) Kuhn ex C. Chr. Ind. Fil. 238. 1905.**

Type: Brazil, *Riedel* (holotype B, Morton photograph 10449).

The authority for *Diplazium riedelianum* is usually stated as Kuhn, Linnaea 36:102. 1869, but at this place the name appears as a synonym only. I cannot find that anyone properly made a combination under *Diplazium* until Christensen in 1905.

30. **Asplenium tenuifolium D. Don, Prodr. Fl. Nepal. 8. 1825.**

***Asplenium concinnum* Wallich, Num. List No. 216. 1829, nom. nud. Based on Nepal, *Wallich*, doubtless on a part of the same collection as the type of *A. tenuifolium* D. Don.**

Type: Nepal, *Wallich*. One would expect a holotype in the British Museum (Natural History), but I was unable to locate one there; a specimen labeled *Asplenium tenuifolium* D. Don is in Brussels, received from Lambert (the employer of D. Don), which is surely an isotype at least and may even be a holotype; it is here designated lectotype until such time as a true holotype may be found in the British Museum (Natural History) or elsewhere (Morton photograph 20949). Isolectotype: Nepal, *Wallich* 216 (US).

Asplenium tenuifolium D. Don is a common species of the Himalayas that has always been correctly understood. So far as I know, there are no validly published synonyms.

31. ASPLENIUM UNILOBUM Poir. *in* Lam. Encycl. Méth. Suppl. 2:505. 1810.
=**Diplazium unilobum** (Poir.) Hieron. Hedwigia 59:332. 1917.
Asplenium semihastatum Kunze ex Mett. Abhandl. Senckenb. Naturforsch. Gesell. 3:206. 1859. Type: Monte Líbano, Oriente, Cuba, *Linden* 1921 (holotype probably B; isotype FI!).
TYPE: Santo Domingo (West Indies), *Nectoux*, FI (holotype, Morton photograph 16116).

The type and type locality of this species has been in doubt. There is no specimen in Paris labeled by Poiret that could be the type. Poiret did not cite a specimen or locality, merely "Amerique meridionale," a term applied vaguely by Poiret, Desvaux, and other early workers to almost any part of tropical America. There is a specimen in the Jussieu Herbarium (Cat. no. 1235) under the name *Asplenium erosum* L. that I formerly thought might be the type (Morton photograph 3017), but this now seems unlikely, for the specimen is from Peru, collected by Joseph de Jussieu, and the species that has been known as *S. unilobum* is known only from the Greater Antilles. In Florence I found a specimen labeled *Asplenium unilobum* Poir. nov. sp., from the Desfontaines Herbarium. Poiret described some new species from the Desfontaines Herbarium (e.g., *Polypodium elegans*) and this is another one, very evidently the holotype. It is from Santo Domingo, collected by Nectoux. The specimen agrees exactly with *Linden* 1921 in Florence, an isotype of *Asplenium semihastatum* Kunze, which agrees with the opinion expressed by Hieronymus.

32. ATHYRIUM FOSBERGII Copel. Occas. Papers Bern. P. Bishop Mus. 14:60, *t. 13.* 1938. =**Diplazium fosbergii** (Copel.) Morton, comb. nov.
TYPE: Nitiperu, Rapa Island, July 18, 1934, *Fosberg* 11577 (isotype US).

This rare species is apparently a Rapa Island endemic. Copeland considered *Diplazium* as a synonym of *Athyrium*, but pteridologists are now generally agreed that the two may be distinguished, although a few species are a little hard to place. One of these is our eastern United States narrow-leaved spleenwort, *Athyrium pycnocarpon*, which has been considered a *Diplazium* by some authors. Since *A. pycnocarpon* has $n=40$ (as always in *Athyrium*), it is an *Athyrium* that is somewhat aberrant rather than a *Diplazium*, in which the chromosome number is $n=41$, so far as known.

33. ATHYRIUM MATANGENSE Copel. Sarawak Mus. Journ. 2:377. 1917. =**Diplazium falcinellum** C. Chr. Ind. Fil. Suppl. 3:73. 1934.
Asplenium matangense Hose, Journ. Str. Br. Roy. As. Soc. 32:58. 1899, nom. prov.
SYNTYPES: Matang, Borneo, *Hose* 74 (presumably K), and 287 (K, Morton photograph 18934).

In the "Index Filicum," Christensen overlooked this species, which he apparently noted only in preparing Supplement 3. In the meantime,

he had applied in 1917 the name *Diplazium matangense* C. Chr. to an entirely different species, and therefore renamed the species of Hose *D. falcinellum* C. Chr. Hose listed this plant as merely *Asplenium* (*Diplazium*) sp. in his list of the ferns of Borneo in 1899. He gave a rather elborate description and ended up by saying that he named the species provisionally *A. matangense*. Since the author himself indicates that he considered his name provisional, we have no option but to consider it a nomen provisorium also, and consequently invalid. Apparently no one discussed the species again until Copeland, who accepted it as a valid species. The epithet *matangense* therefore dates from Copeland. Under *Athyrium*, the name *A. matangense* Copel. is correct; under *Diplazium* the name must be *D. falcinellum* C. Chr.

34. ATHYRIUM MEGISTOPHYLLUM Copel. Phil. Journ. Sci. 56:475, *t.* 7. 1935. =**Diplazium megistophyllum** (Copel.) Morton, comb. nov.

TYPE: Penibuken, Mount Kinabalu, Borneo, 5,000 ft. alt., Oct. 19, 1933, *J. & M. S. Clemens* 40806 (isotype K, Morton photograph 18948).

This is one of the few Diplaziums that has a "spiny" stipe. In this case at least, the "spines" are the knobby persistent and hardened bases of the numerous deciduous stipe scales. This is one of the largest Diplaziums, as indicated by the specific epithet, the middle pinnae being almost a meter long. The caudex is unknown, but it may be conjectured that it is elongate and erect, thus making this a little "tree fern."

35. ATHYRIUM SANCTI-JOHANNIS Copel. Occas. Papers Bern. P. Bishop Mus. 14:59, *t. 10.* 1938. =**Diplazium sancti-johannis** (Copel.) Morton, comb. nov.

TYPE: Tubuai Island, Austral Islands, Aug. 20, 1934, *H. St. John* 16440 (isotype US).

This rare endemic of Tubuai is probably known only from the type collection. It is a relative of *Diplazium membranaceum* (Mett. ex. Kuhn) C. Chr., a more widespread Polynesian species. In the "Index Filicum," the authority is given as "Mett. Linn. 36: 103. 1869 (syn.)"· however, a name published as a synonym is not published at all. Apparently no one else treated this species as a *Diplazium* until Christensen, and so Christensen must be considered the author of the combination *D. membranaceum.*

36. BLECHNUM SOULEYETIANUM Gaud. Voy. Bonite Atlas *t. 134. f. 1–7.* 1845–50. =**Sadleria souleyetiana** (Gaud.) Moore, Ind. Fil. XXVI. 1857 [as "souleytiana"].

TYPE: Sandwich Islands [Hawaii], *Gaudichaud.*

In the "Index Filicum," *B. souleyetianum* [as "*souleytianum*"] is cited as "sine descr." and consequently the name *S. souleytiana* is indicated as first published by Hillebrand in 1888. Although there

is no description, Gaudichaud's *t. 134* gives a full illustration with analyses and consequently provides a valid publication by Art. 42 of the Code. The exact date of publication of *t. 134* is still uncertain. Johnston (Journ. Arn. Arb. 25:487. 1944) gives dates for most of the plates in Gaudichaud's work, but leaves *t. 134* only as "1845–50." Further bibliographic work is indicated.

37. BLECHNUM SQUARROSUM Gaud. Voy. Bonite Atlas *t. 2, f. 1, t. 6, f. 1–6*, 1841.
=**Sadleria squarrosa** (Gaud.) Moore, Ind. Fil. XXVI. 1857.
Blechnum polystichoides Brack. *in* Wilkes, U.S. Expl. Exped. 16:134, 1854.
Type: "Saw Mill," Hawaii, Wilkes Exped. (holotype US).
Sadleria polystichoides (Brack.) Heller, Minn. Bot. Stud. 1:788. 1897.
TYPE: Sandwich Islands [Hawaii], *Gaudichaud*. As lectotype I choose the specimen in Firenze, with the name in the hand of Gaudichaud (Morton photograph 16428); an isotype is in Berlin (Morton photograph 10229). There is probably an isotype in Paris also.

In the "Index Filicum" and in the "Revised List of Hawaiian Pteridophyta" (Bern. P. Bishop Mus. Bull. 25:16. 1925), Christensen adopted the name *Sadleria polystichoides*, remarking in the "Index" that *B. squarrosum* Gaud. was "sine descr."; however, although there is no description by Gaudichaud, there is a plate with analyses and so *B. squarrosum* is validly published by Art. 42 of the Code. The illustration is fine and readily identifiable as the same as the later *B. polystichoides* Brack., which is confirmed also by the isotypes that I have seen. I have seen the name given as "*S. squarrosa* (Gaud.) H. Mann" on some herbarium labels, which I do not understand. The combination was validly published by Moore in 1857, although wrongly attributed to Gaudichaud.

38. BRACHYSORUS WOODWARDIOIDES K. B. Presl, Epim. Bot. 70. 1849 [1851].
=**Diplazium woodwardioides** (K. B. Presl) Morton, comb. nov.
Allantodia sylvatica Blume, Enum. Pl. Jav. 173. 1828, non *Diplazium silvaticum* (Bory) Swartz. Type: Burangrang, Java, *Blume* (holotype L, Morton photograph 674).
Athyrium basilare Fée, Gen. Fil. 197. 1852. Based on *Brachysorus woodwardioides* K. B. Presl. Since the epithet *woodwardioides* was legitimate and available under *Athyrium*, there was no need to change it to "*basilare*," which is thus an illegitimate, superfluous name.
Asplenium woodwardioides (K. B. Presl) Baker *in* Hook. & Bak. Syn. Fil. 229. 1867, non Bernh. 1802.
Athyrium woodwardioides (K. B. Presl) Christ, Bull. Herb. Boiss. 6:154. 1898.
TYPE: Luzon, Philippine Islands, *Cuming* 153 (holotype presumably in Prague, not seen; isotypes BM, Morton photograph 6999, and FI, Morton photograph 16203).

Presl distinguished his genus *Brachysorus* from *Diplazium* primarily by the short sori occupying the lower part of the veinlets and

not extending beyond the vein-fork, and by the sori being solitary rather than back to back. He did not mention the genus *Allantodia* R. Brown, although that is the obvious alliance. The sori are mostly in the lower part of the veins, but they do sometimes extend somewhat above the fork. I have not seen young sori, but it is likely that the indusia are somewhat inflated and at least partly covering the young sporangia, as in *Allantodia australis* R. Brown of Australia and *A. umbrosa* (Ait.) Kaulf. of Madeira. The habit of these plants is entirely that of *Diplazium* rather than *Athyrium*, and the cytological evidence is in favor of this, so far as it goes. Brownlie has found $n=123$ in *A. umbrosa* and Sledge indicates that the related *Diplazium muricatum* (Mett.) van Alderw. van Rosenb. of Java, India, and Ceylon is $n=82$, an indication that the base number of *Allantodia* is $x=41$ as in *Diplazium* rather than $x=40$ as in *Athyrium*. Sledge has suggested that this group, *Diplazium* subg. *Pscudallantodia* (C. B. Clarke) Sledge (Bull. Brit. Mus. [Nat. Hist.] 2:312–315. 1962), may ultimately deserve generic status, in which case the name *Allantodia* is available. Pending a thorough study, however, it is better to place it as a subgenus of *Diplazium*.

39. CHEILANTHES DEALBATA D. Don, Prodr. Fl. Nepal. 16. 1825, non Pursh, 1814. =**Cheilanthes farinosa** (Forsk.) Kaulf. Enum. Fil. 212. 1824, sens. lat.
Gymnia pectinata Buch.-Ham. ex D. Don, loc. cit. in synon.
Hemionitis dealbata Wallich, mss. ex D. Don, loc. cit.
Cheilanthes dealbata Wallich, Num. List. no. 71. 1829, nom. nud. There is no mention of Don and so this must be considered as a different name, although a nomen nudum.
Aleuritopteris farinosa (Forsk.) Fée, Gen. Fil. 154, *t. 12 B, f. 1.* 1852.
SYNTYPES: Narainhetty, Nepal, March 13, 1803, *Buchanan-Hamilton* (BM, Morton photograph 6694, left-hand plant) and Nepal, *Wallich* (BM, Morton photograph 6694, two right-hand plants). The Buchanan-Hamilton specimen is here designated lectotype. There is a duplicate of the Wallich collection in Brussels (Morton photograph 5093, right-hand specimen).

Ching (Hong Kong Nat. 10:201. 1941) places *C. dealbata* D. Don as a synonym of typical *Aleuritopteris farinosa*, but it is doubtful that he saw any types. I must admit that the Himalayan plants do look like those from East Africa, which are presumed to be typical, but there may be some minute differences.

40. COLYSIS HEMIONITIDEA K. B. Presl, Epim. Bot. 147. 1849 [1851]. =**Polypodium hemionitideum** (K. B. Presl) Mett. Abhandl. Senckenb. Naturf. Gesell. 1:112. 1856.
Polypodium hemionitideum Wall. Num. List 10, no. 284. 1829, nom. nud.
Selliguea hemionitidea K. B. Presl, Tent. Pterid. 216, *t. 9, f. 17.* 1836, nom. nud. The illustration is only an analysis, and not a plate with analyses, as required by the Code for valid publication.

Drynaria hemionitidea J. Smith *in* Hook. Journ. Bot. 4:61. 1841, nom. nud. TYPE: Nepal, 1822, *Wallich* no. 284. There may be a specimen of this number in Presl's herbarium in Prague, which will be the holotype. Duplicates are in the East India Company Herbarium at Kew, and elsewhere, including US.

The authority for this species is usually cited, as in the "Index Filicum," as "Wallich" or "Wallich ex Mett.," but from the citations above it is clear that Presl must be considered as the author of the epithet, since he was the first to give a description. It cannot be "Wall. ex Presl" because Wallich had it under *Polypodium*, whereas Presl described it as a *Colysis*. It is still retained in *Colysis* by those recognizing this genus, such as Ching, even though the sori are not confluent and linear, as they ought to be in this genus.

There is a Wallich specimen of this species in the British Museum (Natural History) (Morton photograph 7616) that is labeled in Don's own hand as "*Polypodium membranaceum* D. Don," but it does not represent that species as usually considered, and it does not agree with Don's description. Don's description calls for a very large frond about four inches wide, very membranous, and with scattered, rotund sori, characters that agree with the common Himalayan species usually identified as *P. membranaceum*. *Polypodium hemionitideum* is a smaller plant of thicker texture, with the often somewhat elongate sori in a single median row.

41. CTENOPTERIS AMYLACEA Copel. Phil. Journ. Sci. 84:469. 1955. =**Grammitis amylacea** (Copel.) Morton, comb. nov.
TYPE: Cargadira, Bolivia, *L. Williams* 1134 (US 700281).

42. CTENOPTERIS FRAGILLIMA Copel. Phil. Journ. Sci. 84:470. 1955. =**Grammitis fragillima** (Copel.) Morton, comb. nov.
TYPE: Mount Roraima, *Steyermark* 58882. The holotype is in US, although not so stated by Copeland.

43. CTENOPTERIS HERRERAE Copel. Phil. Journ. Sci. 84:467. 1955. =**Grammitis herrerae** (Copel.) Morton, comb. nov.
TYPE: Copeland cited two collections, *Bues* 1268 and 1269, but without indicating a type or providing locality data. In the United States National Herbarium, he indicated no. 1269 as the type, and it is here designated lectotype; it is from Huadquiña, Department of Cuzco, Peru, collected November, 1920 (US 1515537). The other collection would not have been a suitable type because it is sterile.

44. CTENOPTERIS RHIZOPHORAE Copel. Phil. Journ. Sci. 84:425. 1955. =**Grammitis rhizophorae** (Copel.) Morton, comb. nov.
TYPE: "Colombia, in mangrove swamp along Rio Dagua, alt. 0 to 5 m." is all that Copeland cited, the rest having somehow been lost in the manuscript or printing. The holotype is in the United States National Harbarium (no. 1140066); the remaining data are: Buenaventura, Dept. El Valle, May 7, 9. 1922, *E. P. Killip* 5334.

45. CTENOPTERIS SUBCRASSA Copel. Phil. Journ. Sci. 84:468. 1955. =**Grammitis subcrassa** (Copel.) Morton, comb. nov.

TYPE: Copeland's citation of the type is somewhat defective in that he omits the collector's number, omits an indication of the herbarium where the type is deposited, and cites the collector as "L. A. Brade," in which the "L" is not an initial but stands for the Latin word "Legit" (i.e., collected by). The holotype is *A. C. Brade* 5833, collected at Campo Grande, Serra do Mar, São Paulo, Brazil, November, 1913 (US 1198707).

46. CYCLOPHORUS FOVEOLATUS Alston, Journ. Bot. 78:226. 1940. =**Pyrrosia foveolata** (Alston) Morton, comb. nov.

TYPE: Boridi, Papua, *Carr* 13039 (holotype BM, not seen; isotype L, Morton photograph 826).

This rather common New Guinea species is distinguished by the sori being sunken in pits.

47. DAVALLIA SCABRA D. Don, Prodr. Fl. Nepal. 9. 1825. =**Microlepia marginata** (Houtt.) C. Chr. Ind. Fil. 427. 1906.

Davallia villosa Wallich, Num. List. no. 244. 1829, nom. nud., non *D. villosa* D. Don, 1825. Based on Nepal, *Wallich* in 1821.

Microlepia scabra (D. Don) J. Smith, Journ. Bot. Hook. 1:427. 1842.

Davallia villosa Wallich ex Hook. Sp. Fil. 1:172, *t. 48A*. 1846. Since Hooker cited *Davallia scabra* D. Don as a synonym and since this name was legitimate, prior, and available, Hooker's *D. villosa* must be considered a superfluous renaming of *D. scabra* and based on the same type. Also, *D. villosa* Wallich ex Hook. is an illegitimate later homonym of the different species *D. villosa* D. Don, 1825.

Microlepia villosa (Wallich ex Hook.) K. B. Presl, Epim. Bot. 95. 1849 [1851].

TYPE: Nepal, Wallich (holotype BM, Morton photograph 6901, a sheet with a full frond with a detached stipe and a single detached pinna in the upper right hand corner; the label in the upper right hand corner may be in Don's hand).

48. DICRANOPTERIS PALMATA Underw. Bull. Torrey Bot. Club 34:259. 1907. =**Gleichenia palmata** (Underw.) C. Chr. Ind. Fil. Suppl. 1:113. 1913.

Mertensia palmata Schaffner ex Fée, Mém. Foug. 9:32. 1857, nom. nud.; Fourn. Mex. Pl. 1:137, 1872, nom. nud.

Gleichenia palmata Moore, Ind. Fil. 380. 1862, nom. nud.

TYPE: Orizaba, Veracruz, Mexico, *Pringle* 6129 (NY; isotypes B, US). Distributed originally as *G. pubescens* H.B.K.

The first valid publication of this species was by Underwood as *Dicranopteris palmata*, who designated the type as *Pringle* 6129. Since this is a different collection from the Schaffner specimen intended as the basis for the nomina nuda *Mertensia palmata* Schaffn. and *Gleichenia palmata* Moore, the species must be considered as wholly Underwood's. The first acceptance of the species under the name *Gleichenia* after Underwood's description was by Christensen in the Corrigenda (1913) to the "Index Filicum," where the species is accepted under the name *Gleichenia palmata* (Schaffner) Moore. These authorities are

not in accordance with the Code, since they refer to nomina nuda and also to a species based on a different type. The proper authority is *Gleichenia palmata* (Underw.) C. Chr. Ind. Fil. Suppl. 1:113. 1913 [incorrectly attributed to "(Schaffn.) Moore"]. Other collections referable to this species in the Berlin herbarium are: Orizaba, Veracruz, Mexico, *Müller;* San Andres, Veracruz, Mexico, *Schiede & Deppe* 727; Jalapa, Veracruz, Mexico, *Ehrenberg* 843; Mexico, *Schaffner;* and Mabess River, Jamaica, *Harris* 7597. All of these are filed as *G. furcata*, following identifications of Hieronymus, but they are not close to the true *furcata* of the Lesser Antilles.

49. **Diplazium caudatum** J. Smith *in* Hook. Journ. Bot. 3:408. 1841, nom. nud.; C. Chr. Ind. Fil. Suppl. 3:72. 1934, nom. nud. =**Diplazium melanopodium** Fée, Mém. Foug. 8:85. 1857.
Athyrium melanopodium (Fée) Copel. Fern Fl. Phil. 401. 1960 [wrongly attributed to Fée].
?*Diplazium meyenianum* K. B. Presl, Epim. Bot. 88. 1849 [1851]. Type: Manila, Philippine Islands, *Meyen* (Herb. Presl, Prague).
?*Asplenium aspidioides* Goldm. Nov. Acta Acad. Leop. Caes. Nat. Cur. 19, Suppl. 1:461. 1843, non Schlecht., 1825. Type: Manila, Philippine Islands, *Meyen* (presumably B).
TYPE: Since *D. caudatum* J. Smith is a nomen nudum, it does not strictly speaking have a type, but it was intended to be based on Luzon, Philippine Islands, *Cuming* 158.

Christensen was in error in taking up the same *Diplazium caudatum* J. Smith, for this was a nomen nudum only. As a synonym he cited *Athyrium meyenianum* Copel. (Phil. Journ. Sci. 3C:295. 1908), but this was an error also, for *A. meyenianum* was not a new species of Copeland but merely a new combination based on *Diplazium meyenianum* K. B. Presl, which Christensen specifically excluded from his concept of *D. caudatum*. Doubtless, Christensen intended *Athyrium meyenianum* sensu Copel. excl. synon., but there was no description by Copeland at the place cited that would serve to validate the name *D. caudatum*. The other synonym cited by Christensen, *D. melanopodium* Fée, was cited only with a query, and so this cannot validate the publication of the name *D. caudatum* J. Smith either. Hieronymus (Hedwigia 59:337. 1917) believed that *D. meyenianum* K. B. Presl was identical with the Hawaiian *D. arnottii* Brack., of the Hawaiian Islands, but Holttum, in his recent paper on Presl types, indicates that this is doubtful and that the species needs further study.

50. **Diplazium crenulans** Fée ex Baker *in* Hook. & Bak. Syn. Fil. 232. 1867, in obs.
Diplazium legalloi Proctor, Rhodora 68:466. 1966.
Diplasium celtidifolium sensu auctt. as to plants from the Lesser Antilles.
Diplazium callipteris sensu auctt. as to plants from the Lesser Antilles.
TYPE: Guadeloupe, *L'Herminier* 67 (holotype K, Morton photograph 18581).

Diplazium crenulans is mentioned by Baker only in an observation, but there is enough description to validate the name. This species has usually been called *D. callipteris*, as by Fée himself, who kept that species distinct from *D. celtidifolium* Kunze, which he also attributed to the Antilles. Proctor, however, states that the type of *D. callipteris* came from Venezuela, rather than from Cuba as stated by Fée, and that it represents *D. celtidifolium*. He does not state that he has seen authentic material, but that is the inference. He is very likely right, because no species closely allied has ever been collected since in Cuba.

There are two other specimens at Kew of *D. crenulans*, but they came from the T. Moore Herbarium, which was purchased in March, 1885, and so these were not studied by Baker presumably; they are also from Guadeloupe, collected by L'Herminier, and may be part of the same gathering (Morton photographs 18582, 18582a) although the pinnae are merely crenate-dentate in one (rather than lobulate) and subentire in the other; this species appears to vary in these respects, perhaps according to the size of the plants or the position of the pinnae gathered. It would appear that the lowest and largest pinnae are lobulate, the middle crenate-dentate, and the upper subentire. Another specimen mounted on two sheets is also at Kew, collected in Guadeloupe by L'Herminier (Morton photographs 18583, 18584); it is identified by Fée as *D. callipteris* var. *undulatum*, an unpublished name, probably intended originally to have something to do with *Diplazium undulosum* Swartz, which was based on Plumier, Tract. Fil. *t. 107*. and which is listed in the "Index Filicum" as a dubious species. Plumier's illustration is one of his more esoteric ones, but it is clear that it cannot possibly represent a *Diplazium*. The illustration and the accompanying description show large sized pinnae and many transverse veinlets. Among the plants known from Martinique it can only represent *Thelypteris* [*Meniscium*] *reticulatum* (L.) Proctor. Fée (Mém. Foug. 11:40. 1866) indicated that *D. undulosum* Swartz was probably a *Meniscium*.

51. Diplazium falcatum D Don, Prodr. Fl. Nepal. 13. 1825. =**Coniogramme fraxinea** (D. Don) Diels *in* Engl. & Prantl, Nat. Pflanzenfam. 1(4):262. 1899.

Hemionitis falcata Buch.-Ham. mss. ex. D. Don. loc. cit.

Gymnogramma falacta (D. Don) J. Smith, Journ. Bot. Hook. 4:51. 1842.

Coniogramme falcata (D. Don) Salomon, Nomencl. 139. 1888.

Type: Narainhetty, Nepal, March 1, 1803, *Buchanan-Hamilton* (holotype **BM, Morton photograph 6691**).

In his monograph of *Coniogramme*, Hieronymus (Hedwigia 57:325. 1916) considered *D. falcatum* as a dubious species, perhaps a synonym of *C. fraxinea*, which appears to be true. It seems odd that Don would

describe the same species twice, but this is explained by the fact that his *D. fraxineum* had the lower pinnae ternate or pinnate and his *D. falcatum* had them simple. It seems that this species varies in this respect, but the matter deserves study in the field. If the form with simple pinnae should be considered different, the name *C. falcata* (D. Don) Salomon is available for it.

52. Diplazium proliferoides Bory *in* Bélanger, Voy. Bot. 2:38. 1833. =Diplazium proliferum var. proliferoides (Bory) Morton, comb. nov.

***Athyrium accedens* var. *proliferoides* (Bory) Tardieu, Bull. Mus. Hist. Nat. Paris II, 29:290. 1957.**

Type: Mauritus, *Bélanger* (holotype presumably P; isotype FI, Morton photograph 16154).

This is a form of the widespread *Diplazium proliferum* with the pinnae rather deeply lobed; consequently, the venation is simpler, most of the veins being connivent to the sinuses and only occasionally anastomosing. Madame Tardieu, who has seen abundant material from Mauritius and Réunion, however, considers it not specifically distinguishable from typical *D. proliferum*. Whether the Javan *D. accedens* Blume is specifically different remains an open question.

53. Drymoglossum subcordatum Fée, Mém. Foug. 3:29. 1852. =Lemmaphyllum microphyllum K. B. Presl, Epim. Bot. 263. 1849 [1851].

Syntypes: Coast of China, *Gaudichaud* (FI. with the name in Fée's hand, Morton photograph 16218), and Amboina, *Labillardière* (FI, with the name in Fée's hand, Morton photograph 16219).

Christensen (Dansk. Bot. Ark. 6(3):46, 47, 86. 1929) discussed the identity of *D. subcordatum*. He had not seen the syntypes, but decided that Fée's description agreed best with material from China, and so chose the Gaudichaud collection as lectotype. Judging from the locality "Amboina," he believed that the second syntype represented an entirely different species, *Drymoglossum fallax* van Alderw. van Rosenb., and from my photograph of the Labillardière specimen it appears that he is right, although there is only one fertile frond on the sheet and the photograph is not sufficiently detailed to show the arrangement of the sporangia, which is very peculiar in *D. fallax*, the sporangia being arranged in a single row, as Christensen expresses it "like cakes in a tinbox." Christensen thought that Fée's figure (Gen. Fil. *t 9A, f. 1.* 1852) represents the Amboina plant, but it does not seem so to me; judging from the disposition of the sporangia, it seems that the fertile leaf at least is *Lemmaphyllum microphyllum*, and I think that the sterile leaves are also *L. microphyllum*. The stellate hair shown was probably not drawn from material of *D. subcordatum* at all, since it is indicated as representing the hairs of three different species. The sterile fronds of the Labillardière specimen are definitely cuneate at

the base, and therefore Fée's description of these as subcordate is not applicable, nor is the specific epithet *subcordatum*. But sometimes Chinese specimens of *L. microphyllum* from Hong Kong really are subcordate, another point indicating that the Gaudichaud plant is the correct lectotype.

54. DRYNARIA STENOPHYLLA Fée, Mém. Foug. 6:18, *t. 8, f. 3.* 1853, non J. Smith. 1841. =**Polypodium stenophyllum** Blume, Enum. Fil. Jav. 124. 1828.

Drynaria stenophylla (Blume) J. Smith, Journ. Bot. 3:397. 1841. Based on *Polypodium stenophyllum* Blume.

Crypsinus stenophyllus (Blume) Copel. Gen. Fil. 206. 1947.

TYPE: Luzon, Philippine Islands, *Cuming* 122 (isotype FI, Morton photograph 16028).

Drynaria stenophylla Fée (1853) is usually mentioned (if at all) as though it were the same as *D. stenophylla* J. Smith (1841), but it is not. Smith's name was a new combination based on *Polypodium stenophyllum* Blume, and the type is therefore the same as Blume's type from Java. Fée attributed his *D. stenophylla* to J. Smith, but he described it as a new species based on *Cuming* 122 from Luzon, Philippine Islands, and made no mention of Blume. Therefore, *Drynaria stenophylla* Fée must be considered as nomenclaturally a different species since it has a different type; it is thus a legitimate name under *Drynaria*. The Philippine Island plant represented by *Cuming* 122 is considered by Copeland as taxonomically the same as the Javan *P. stenophyllum* Blume (Java, *Blume*, holotype L, Morton photograph 1969), but Copeland did not see the Blume type, which may or may not be the same.

55. DRYOPTERIS CHEILANTHINA C. Chr. Kungl. Svensk. Vetensk. Akad. Handl. (Stockholm) III, 16(2):34. March, 1937. =**Ctenitis cheilanthina** (C. Chr.) Morton, comb. nov.

TYPE: Morne Cabaio, near Robergeau, Nouvelle Touraine, Selle, Haiti, *Ekman* 1689 (isotype US).

Collected several times by Ekman but not otherwise.

56. DRYOPTERIS MERIDIONALIS (Poir.) C. Chr. var. SPELUNCAE C. Chr. Dansk. Vid. Selsk. Skrift. VIII, 6:47. 1920. =**Ctenitis meridionalis var. speluncae** (C. Chr.) Morton, comb. nov.

TYPE: Six collections were cited, all from Bermuda, none of which was designated as the type. As lectotype I choose: Sink hole, Paynter's Vale, Bermuda, Aug. 3–Sep. 20, 1905, *S. Brown & N. L. Britton* 266 (US 524898). This is a good specimen, identified by Christensen.

57. DRYOPTERIS SANCTA var. PORTORICENSIS C. Chr. Smiths. Misc. Coll. 52, no. 1867:380. 1909. =**Thelypteris sancta var. portoricensis** (C. Chr.) Morton, comb. nov.

Aspidium sanctum var. *portoricense* Kuhn, Bot. Jahrb. Engler 24:115. 1897, nom. nud.

Thelypteris sancta var. *portoricensis* (Kuhn) Morton, Amer. Fern Journ. 53:64. 1963, nom. nud.

TYPE: There were three syntypes cited, but no lectotype has been designated. As lectotype I choose the second syntype: Utuado, Puerto Rico, *Sintenis* 5956 (US, with the name in Christensen's hand). The third syntype, *Underwood & Griggs* 60 is also in US, as is a duplicate of the first syntype, *Sintenis* 403, the latter, however, without the name in Christensen's hand.

It has been pointed out to me that when, in 1963, I attempted to publish a new combination for this variety under *Thelypteris* that I wrongly cited a nomen nudum as the basionym. Although the epithet *portoricense* originated with Kuhn the variety was really first described later by Christensen.

58. DRYOPTERIS STEGNOGRAMMA var. ASPLENIOIDES C. Chr. Acta Hort. Gotob. 1:56. 1924. =**Thelypteris dasypoda** Morton, nom. nov.

Stegnogramma asplenioides (C. Chr.) Ching, Sinensia 7:94. 1936, non *Thelypteris asplenioides* (Swartz) Proctor.

SYNTYPES: Christensen cited Szechuwan, China, *H. Smith* 2116, and Khasia, India, collector not stated. Ching chose Khasia, *Griffith* as lectotype.

Christensen indicated the author of his var. *asplenioides* as "(J.Sm.) C. Chr.," as though it were a new combination of some validly published name, but I cannot find that Smith ever published any name that could be a basionym, and therefore the variety must be attributed to Christensen only. Similarly, Ching in transferring this variety to *Stegnogramma* attributed the name *Stegnogramma asplenioides* to "J. Sm. mss.," but since the first describer was Christensen, the proper authority must be "(C. Chr.) Ching." As to the distinctness of *Stegnogramma* as a genus, see my remarks in Amer. Fern Journ. 56:177–179. 1966. Since the epithet "*asplenioides*" has already been used in *Thelypteris*, a new name is necessary for this species.

59. **Elaphoglossum alatum** Gaud. *in* Vaillant, Voyage Autour du Monde Bonite, Bot. Atlas *t. 135*. 1845–50.

In my previous paper on fern types (Contr. U. S. Nat. Herb. 38:44. 1967) I stated that *Elaphoglossum alatum* Gaud. was a synonym of *E. gorgoneum* (Kaulf.) Brack. When this was written I had not seen the paper "A Revision of the Hawaiian Species of Elaphoglossum," by W. R. Anderson and M. R. Crosby (Brittonia 18:380–397. 1966), in which it is indicated that a study of the type specimen has shown that *Acrostichum gorgoneum* Kaulf. does not represent *E. gorgoneum* as usually named but is a synonym of *Acrostichum aemulum* Kaulf. [=*Elaphoglossum aemulum* (Kaulf.) Brack]. Anderson and Crosby were probably the first to unite these two species, and therefore their choice of the epithet *aemulum* must be followed; this is the best anyway for avoiding confusion, since the epithet *gorgoneum* has been so

widely used for the different species *E. alatum* Gaud., which is the correct name for this species. *Aconiopteris obtusa* Fée (1845) is perhaps earlier, but the epithet *obtusa* may not now be transferred to *Elaphoglossum* because of the different *E. obtusum* A. Peter (1929).

60. EPIDRYOPTERIS LYCOPODIOMUS Roqas, Bull. Acad. Géogr. Bot. [Le Mans] 28:156. 1918. =**Polypodium vacciniifolium** Langsd. & Fisch. Icon. Fil. 8, *t.* 7. 1810.

In a paper entitled "Addenda ad Floram regionis Chaco Australis," N. Rojas Acosta published a new genus and species called peculiarly enough *Epidryopeteris lycopodiomus*, based on material from Paraguay, presumably collected by himself. In 1958, I wrote asking about this plant to the Jardin Botánico in Asunción, where the Rojas herbarium is presumably preserved, but I never received a reply. Although Christensen in the "Index Filicum," Supplement III, referred the genus to *Polypodium* with a query, the species has never been definitely placed. The original description is as follows:

Scandens, filiformis, ramosa, setoso-paleacea vel albida, 20–60 cm. longa, frondibus alternis, glabris, rotundo-ellipticis, supra nitidis, fertilibus linearibus, soris solitariis.

Oct. Nov. Voisin du *Polypodium lycopodioidcum* de Mexico.

Croît dans les forêts humides et ombreuses sur les troncs et les rameaux des arbes, surtout aux bords du Paraná et du Rio Bermejo.

There are not many epiphytic ferns in Paraguay, and the only one that agrees with the description in having an elongate, scandent, epiphytic, whitish-scaly rhizome, rotund-elliptic and shining sterile blades, and linear fertile blades is *Polypodium vacciniifolium* Langsd. & Fisch. The identification can be considered certain, even in the absence of type material.

61. GLEICHENIA BIFURCATA Blume, Enum. Pl. Jav. 250. 1828. =**Gleichenia truncata** (Willd.) Spreng. *in* L. Syst. Veg. ed. 16, 4:25. 1827.

TYPE: Boerengrang, Java, *Blume* (holotype L, with the name in Blume's hand, Morton photograph 1421).

This species was overlooked in Holttums' account of *Gleichenia* in the "Flora Malesiana" (II, 1(1):4–27. 1959), but the type was annotated by Holttum in 1957 as *G. truncata.*

62. GLEICHENIA LAEVIGATA var. BRACTEATA Rosenst. Repert. Sp. Nov. Fedde 5:370. 1908. =**Gleichenia truncata var. bracteata** (Rosenst.) Holttum, Reinwardtia 4:271. 1957.

TYPE: Rosenstock gave no description, but his varietal name is validated by his reference to Hooker and Baker's characterization of *G. bracteata* Blume (Syn. Fil. 14. 1865); the Hooker and Baker description was based on Java, *Blume in* Herb. Hook., and the holotype is therefore at Kew.

Holttum considered the species *Gleichenia bracteata* Blume ex Hook. & Bak. validly published, and consequently cited "Blume ex Hook. &

Bak." as the parenthetical author. However, even though Hooker and Baker did mention a few of the characters of Blume's *G. bracteata*, they did not accept the species; since it was published as a synonym only it cannot be valid. Holttum indicated that the holotype of *G. bracteata* is in Leiden, but the description by Hooker and Baker was of a Blume plant in the Hooker Herbarium at Kew, and this must therefore be the holotype.

63. GLEICHENIA LANIGERA D. Don. Prodr. Fl. Nepal. 17. 1825. =?**Dicranopteris linearis** (Burm. f.) Underw. Bull. Torr. Bot. Club 34 :250. 1907.
TYPE: Sirinagur, India, *Kamroop* (not seen).

There is in the British Museum (Natural History) a sheet annotated *Gleichenia lanigera* Don but this is from "in alpibus Nepaliae," not Sirinagur. It was probably collected by Wallich and is a part of his no. 157, i.e., *Gleichenia gigantea* Wallich. Not only is the locality different but the plant is also different, apparently, for this sheet is one of the pinnate type like *G. glauca* (Thunb.) Hook., whereas Don described his species as variously dichotomous. Don's species is considered to be *Dicranopteris linearis* (Burm. f.) Underw., according to J. Smith (quoted by Hooker, Sp. Fil. 1 :5. 1844, under *Gleichenia dichotoma*).

64. GLEICHENIA LINEARIS var. BIDENTATA van Alderw. van. Rosenb. Bull. Jard. Bot. Buitenzorg III, 5 :204. 1922. =**Dicranopteris linearis** (Burm. f.) Underw. var. **linearis.**
TYPE: Several syntypes were cited; of these I have seen Bünnemeijer 7881, from Mount Djantan, Poeloe Karimon Island, Riouw Archipelago (L, Morton photograph 1425).

This variety was overlooked in Holttum's revision of Gleichenia in the "Flora Malesiana." From the photograph of the syntype cited above it appears that the variety can be safely referred to var. *linearis*.

65. GLEICHENIA LINEARIS var. CRASSIFRONS van Alderw. van Rosenb. Bull. Jard. Bot. Buitenzorg III, 5 :204. 1922. =**Dicranopteris linearis** (Burm. f.) (Blume) Holttum, Reinwardtia 4 :277. 1957.
TYPE: Foramadiahi, Ternate Island, Mar. 11, 1921, *Beguin* 1501 (holotype L, Morton photograph 1426).

This variety was overlooked in Holttum's revision of *Gleichenia* in the "Flora Malesiana." The occurrence of var. *rigida* in Ternate is not mentioned either, but it was to be expected since it occurs in Tidore and the Celebes. Another variety that was overlooked is *Gleichenia linearis* var. *irregularis* van Alderw. van Rosenb. (Malay. Ferns Suppl. 84. 1917) ; no collections were cited for this variety and so the type (or a lectotype) can be determined only by consultation with van Alderwerelt's material so named in Bogor and Leiden; the variety appar-

ently can be referred to *Dicranopteris linearis* var. *alternans* (Mett.) Holttum going on description and probability.

66. Gleichenia longissima var. nivea Blume, Enum. Pl. Jav. 251. 1828.

TYPE: Java, *Blume* (holotype L, with the name in Blume's hand, Morton photograph 1441).

This is apparently a form in which the segments are even more strongly glaucous beneath than usual. The varietal name was overlooked by Holttum in the "Flora Malesiana."

67. GRAMMITIS SCOLOPENDRIOIDES Gaud. *in* Freycinet, Voy. Monde Uranie 310. Aug. 1828. =Loxogramme scolopendrioides (Gaud.) Morton, comb. nov.

Grammitis scolopendrina Bory *in* Duperrey, Voy. Monde Coquille, Crypt. 267, ***t. 30, f. 1***, Nov. 1829. Type: New Ireland, *d'Urville* (holotype P, Morton photograph 21514). The locality was originally stated as "New Zealand," but this was surely a slip, for the species is not known from New Zealand, and the holotype clearly came from New Ireland, in the New Hebrides.

Loxogramme scolopendrina (Bory) K. B. Presl, Tent. Pterid. 215. 1836.

TYPE: Rawak [=Lawak] Island, near New Guinea, *Gaudichaud* (holotype P, with the name in Gaudichaud's hand, Morton photograph 21512).

In the "Index Filicum," Christensen indicated that *Grammitis scolopendrioides* Gaud. was probably the same as *G. scolopendrinum* Bory, but apparently no one has ever studied the type and confirmed this. These two species were published at about the same time, but Stafleu's "Taxonomic Literature" shows that Gaudichaud's name clearly has priority by over a year. The species is close to *Loxogramme involuta* (D. Don) K. B. Presl but is kept distinct by Copeland in his "Grammitidaceae of New Guinea" (Phil. Journ. Sci. 81:117. 1952).

68. GYMNOGRAMMA EGGERSII Christ, Bull. Soc. Roy. Bot. Belgique 32(2):92. 1894 [June 27, 1895]. =Asplenium monteverdense Hook. Second Cent. *t. 41.* 1860.

Anogramma eggersii Christ *in* C. Chr. Ind. Fil. 58. 1905.

Asplenium mortonii Duek, Adansonia 11:718. 1971. Based on ***Anogramma eggersii*** Christ, non ***Asplenium eggersii*** Sodiro.

TYPES: Jagüey, Oriente, Cuba, alt. 500 m., March, 1889, *Eggers* 4882a (holotype P, Morton photograph 3593).

Christ failed to see the indusia and so referred this plant to *Gymnogramma;* however, the indusia are quite obvious, and the specimen differs in no way from the type of *Asplenium monteverdense* (*Wright* 1029), which came from Monteverde, Oriente, Cuba, not very far from Jagüey, which was misread by Christ as "Jaqueij." In its rather elongate ultimate segments *A. monteverdense* Hook. is only slightly different from *Asplenium myriophyllum* (Swartz) Presl, to which it has been referred as a synonym; however, it may tentatively be maintained as a species, pending cytological study.

69. HEMIONITIS DEALBATA Willd. Hort. Berol. 1:*t. 40*. 1805. =**Pityrogramma tartarea** (Cav.) Maxon, Contr. U.S. Nat. Herb. 17:173. 1913.

In his paper on *Pityrogramma* (Contr. Gray Herb. 189:65. 1962), Tryon stated that *Hemionitis dealbata* Willd. is a superfluous and illegitimate name, a renaming of *Acrostichum tartareum* Cav., but this is an error, due to Tryon's having cited the wrong place of publication. *Hemionitis dealbata* was not first published in Willdenow's edition of the "Species Plantarum" in 1810, but was published in 1805, with a detailed description. In this 1805 publication, *Acrostichum tartareum* Cav. is not mentioned. *Acrostichum ebenum* L. is cited as a synonym, but only with a query, showing that the species was based on a specimen. The locality is cited as "in America australi ad fluvium nigrum."

The description and plate of Willdenow were based on material cultivated in the botanical garden in Berlin. No cultivated material collected by Willdenow is known. In the Willdenow Herbarium in Berlin there are three sheets determined as *H. delabata* under the number 19568, two of them collected by Humboldt and one by Swartz. I translate Willdenow's locality "ad fluvium nigrum" as referring to the Rio Negro in Brazil. Swartz never collected in South America, and so the cultivated material could not have been obtained from his collection. According to the account of *H. dealbata* in Humboldt, Bonpland, and Kunth's "Nova Genera," Humboldt collected this species near Guanajuato, Mexico, and so the Humboldt collection cannot have been the original source of the material either. Therefore, there is no herbarium specimen available as a holotype or lectotype, and the species must be typified on the original description and plate, which are fortunately rather good and complete. These show that Tryon was right in considering this species a synonym of *Pityrogramma tartarea* (Cav.) Maxon. The plant described and depicted was, however, a very small one of this species, probably due to its being unhappy under cultivation.

70. **Hymenophyllum capillare** Desvaux, Mém. Soc. Linn. Paris 6:333. 1827.

In my first paper on fern types (Contr. U.S. Nat. Herb. 38:76. 1967), I placed *H. capillare* Desv. as a synonym of *Hymenophyllum aeruginosum* (Poir.) Carm., going on the locality Tristan d'Acunha, since that is the only species of this alliance on that island. Dr. E. A. C. L. E. Schelpe kindly drew my attention to a note by Christensen in his paper "The Pteridophytes of Tristan da Cunha" (1940), in which it is indicated that the holotype in Paris has the locality corrected from Tristan d'Acunha to Bourbon. I have photographed this holotype (Morton photograph 4548). It is identical with *H. pendulum* Bory (1833) and

is the correct oldest name for that species of the Mascarene Islands. It is thus to be excluded from the flora of Tristan d'Acunha.

71. **Hymenophyllum fusugasugense** Karst. ex Sturm, Bot. Zeit. 1859:297. 1859.

A specimen in the Hamburg herbarium collected at Fusugasuga, Bogotá, Colombia, 2,700 m. alt. by H. Karsten is probably the type. It agrees with the illustration by Karsten (Fl. Col. 2:*t. 155, f. 1–8.* 1862–69) and with my delimitation (Contr. U.S. Nat. Herb. 29:186. 1947), but as I have shown (Amer. Fern Journ. 43:175. 1953), this species should be called *H. tomentosum* Kunze var. *fusugasugense* (Karsten) Morton.

72. **Hymenophyllum interruptum** Kunze, Linnaea 9:107. 1834.
TYPE: Pampayacu, Peru, *Poeppig* 1104.

A specimen in the Hamburg herbarium merely indicated as collected in Peru by Poeppig is probably an isotype. It is a detached and somewhat depauperate frond that matches closely a frond on the collection *Schunke* 183, from Chanchamayo Valley, Junín, Peru, as cited by me (Contr. U.S. Nat. Herb. 29:178. 1947). It will not key out very well, however, because the rhachis is, exceptionally, alate to the base, and even the stipe is a little alate at the apex. Still, there is no doubt as to the correctness of the usual concept of this species.

73. **Hymenophyllum molle** Morton. Contr. U.S. Nat. Herb. 29:149. 1947.

A specimen in Hamburg collected at Agapata, Peru, by Lechler is typical of this local Peruvian species. It bears the name *Hymenophyllum myriocarpum* Hook. and is doubtless *Lechler* 2250a, listed by Mettenius as "*H. myriocarpum* Hooker ?" (Filices Lechlerianæ 1:26. 1856). It is, however, by no means *H. myriocarpum*, which is a glabrous species belonging to a different subgenus. Someone, probably C. Müller, has written "*H. myriocarpoides* C. Müll. n. sp.," but this name is unpublished.

74. HYMENOPHYLLUM NITENS Wercklé ex Christ, Bull. Herb. Boiss. II, 4:946. 1904, non R. Brown, 1810. =**Hymenophyllum crispum** H. B. K. Nov. Gen. Sp. 1:26. 1816.

Hymenophyllum micans Christ, Bull. Herb. Boiss. II, 5:260. 1905. Based on *H. nitens* Wercklé, non R. Brown.

TYPE: Costa Rica, without specific locality, *Wercklé* 249 and 252. Syntypes presumably P; two apparent isosyntypes BR, Morton photographs 19866, 19867.

The two apparently authentic collections that I have seen in Brussels agree with the brief original description. They are clearly typical *H. crispum* as it grows in Costa Rica. In my revision of the section

Sphaerocionium I omitted this species, believing at the time that it belonged in section *Mecodium*.

75. Hymenophyllum tenellum D. Don, Prodr. Fl. Nepal. 12. 1825.
Hymenophyllum exsertum Wallich, Num. List. no. 170. 1829, nom. nud. Based on Nepal, *Wallich* in 1821.
Hymenophyllum exsertum Wallich ex Hook. Sp. Fil. 1:109, *t.* 38*A*. 1844. Syntypes: *H. exsertum* Wallich Cat. no. 171, Nepal, *Wallich*, and *H. densum* Wallich Cat. no. 170, Nepal, *Wallich*. Hooker here has the names reversed from those in Wallich's "Numerical List," where *H. exsertum* is no. 170 and *H. densum* no. 171. This is surely a slip of the pen, and the species should be considered based on the plant called *exsertum* by Wallich, namely no. 170; the specimen of this number in Kew is here designated lectotype. An isolectotype is in US. Another reason for not choosing no. 171 is that this number perhaps does not represent the species described. At least the specimen in US of this number, which bears the name *Hymenophyllum densum* Wallich, is not a *Hymenophyllum*, but is *Trichomanes bipunctatum* Poir.; our specimen is so annotated by Copeland. I do not know what the Kew material of this number may be. *Trichomanes bipunctatum* does resemble this species of *Hymenophyllum* a little, and so it could be that both Wallich and Hooker were mistaken in referring their plants to *Hymenophyllum;* the *Trichomanes* can be distinguished at once by the thicker rhizome, which is densely covered by short, black trichomes.
Mecodium exsertum (Wallich ex Hook.) Copel. Phil. Journ. Sci. 67:23. 1938.
LECTOTYPE: Nepal, *Buchanan-Hamilton* (BM, Morton photograph 6592). The other syntype is Nepal, *Wallich*, which I have not seen. Presumably it is a part of the same collection that was the basis of Wallich List no. 170, i.e., *H. exsertum* Wallich.

In the "Index Filicum," *Hymenophyllum tenellum* D. Don is listed as a dubious species. Copeland in his revision of the Old World *Hymenophyllum* listed it as a synonym of *H. polyanthos* (Swartz) Swartz; he had not seen the type but merely says: "Wallich 172 must be discussed, because, as it is recognized as *H. polyanthos* by Hooker, Sp. Fil. 1:102, I see no reason to doubt that it is *H. tenellum* Don, which Hooker listed, page 112, as a 'dubious species.'" This is a non sequitur, for the fact that Hooker listed *H. tenellum* as a dubious species is no reason for associating it with the plant called *H. polyanthos* by Hooker. Apparently it did not occur to Copeland that there are other species in Nepal to which Don's name might apply, in particular *H. exsertum*. This species is somewhat similar to *H. polyanthos*, but the division of the blade is a little different, and a distinguishing character is the presence of hairs on the rhachis; the rhachis of *H. polyanthos* in all its many forms is entirely glabrous.

76. LASTREA ACUMINATA Houlston, Gard. Mag. Bot. Hort. Floricult. Nat. Sci. 1851:317. 1851. =**Lastreopsis acuminata** (Houlston) Morton, comb. nov.
Aspidium shepherdii Kunze ex Mett. Fil. Hort. Lips. 94. 1854. Mettenius was the first to give a description of *Aspidium shepherdii* Kunze, a nomen

nudum when first published (Linnaea 23:230. 1850). Kunze's plants were cultivated at Kew in 1822, Berlin in 1842, and Leipzig in 1843. The syntypes were destroyed in Leipzig during the war, but there are probably some isosyntypes in Berlin that will provide a suitable lectotype, presumably one in the Mettenius Herbarium. Dr. Tindale indicates that the holotype is in the Christensen Herbarium in the British Museum (Natural History), but this is impossible. As indicated above there was no holotype, only three syntypes, and none of these could be in the Christensen Herbarium (unless Christensen stole one from Leipzig before the war, which is not likely).

Lastrea atrovirens J. Smith, Cat. Cult. Ferns 59. 1857. Type: Cultivated at Kew (holotype J. Smith Herbarium, BM 2 sheets, Morton photographs 6463, 6464).

Dryopteris shepherdii (Kunze) C. Chr. Vict. Nat. 60:155. 1944.

Lastreopsis shepherdii (Kunze) Tindale, Vict. Nat. 73:182. 1957.

TYPE: A plant cultivated by Loddiges in 1842 (holotype Herb. Houlston, BM, 2 sheets, Morton photographs 6771, 6772).

In her fine "A Monograph of the Genus Lastreopsis Ching" (Contr. New South Wales Nat. Herb. 3:249–339. 1965), Dr. Tindale has overlooked *Lastrea acuminata* Houlston, perhaps because in Supplement 3 of the "Index Filicum" (p. 117. 1934) the locality is given as "Nepal." Houlston's plant, however, was cultivated from some unknown source and he only guessed that it might be from Nepal. His type, now in the British Museum (Natural History), is identical with the type of *L. atrovirens* J. Smith, and their plants probably came from the same source. It is indeed quite likely that the original cultivated plants of *Aspidium shepherdii* Kunze also came from the same source at Kew, where it was said by Kunze to be in cultivation as early as 1822. Houlston described his *L. acuminata* as a new species, with no reference or suggestion that it might be the same as *Aspidium acuminatum* Willd. The confusion with Willdenow's *A. acuminatum* was due to Lowe, who later illustrated Houlston's species (Ferns Brit. & For. 6:*t. 11.* 1857) but attributed the name to Willdenow, for what reason cannot be imagined, because *Aspidium acuminatum* Willd. is an utterly different plant, considered to be a synonym of *Nephrolepis biserrata.*

Inasmuch as the original description was published in a rather rare journal, rare at least outside of England, I give below a transcript of it:

L. acuminata J. H.—An evergreen warm greenhouse Fern, the native country of which is doubtful; prob. from Nepal. Frond glabrous, triangularly elongate, bipinnate, a foot or more long, dull green; pinnae triangularly elongate-acuminate; pinnules oblong-ovate, lower ones entire, and slightly pinnatifid, upper ones decurrent at the base, and rather rigidly toothed. Sori medial. Stipes scaly at the base, terminal, adherent to a somewhat tufted rhizome.

77. LASTREA SPINESCENS Houlston, Gard. Mag. Bot. Hort. Floricult. Nat. Sci. 1851:318. 1851. =**Lastreopsis decomposita** (R. Brown) Tindale, Vict. Nat. 73:183. 1957.

TYPE: Cultivated by S. Rucker, Wandsworth, England, 1850 (holotype BM, ex Herb. Houlston, Morton photograph 6769).

This species is omitted in Dr. Tindale's monograph of *Lastreopsis*, but she wrote me some years ago that *L. spinescens* was probably a synonym of *L. decomposita*. An examination of the type shows that this is indeed the case. Houlston believed that his species was from the "East Indies" but it was surely from Australia. Since the original journal is rare, I give below a transcript of the original description:

L. spinescens J. H.—An ornamental, evergreen stove Fern, from the East Indies. Fronds pubescent, deltoid, one and a half to two feet long, dull green, tripinnate; pinnules linear-lanceolate, pinnatifid, decurrent at the base, with rather ovate slightly dentate segments, terminating in a long spinous mucro. Sori submarginal. Stipes scaly. Fronds lateral, adherent to a scaly creeping rhizome. This species is also rare in cultivation, although introduced ten years ago, among some orchids, by S. Rucker, Esq., of Wandsworth.

78. LEPTOSTEGIA LUCIDA D. Don, Prodr. Fl. Nepal. 14. 1825. =**Onychium japonicum var. lucidum** (D. Don) Christ, Bull. Soc. Bot. France 52, Mém. 1:60. 1905.

Cheilanthes lucida Wallich, Num. List. no. 69. 1829, nom. nud.

TYPE: Narainhetty, Nepal, Feb. 22, 1803, *Buchanan-Hamilton* (holotype BM, Morton photograph 6697, right-hand plant; the left-hand plant is Kumaun [Kamaoun], *Duthie* 3675).

There has been some doubt about the identity of this species, the type and only species of the genus *Leptostegia* D. Don. For a long time it was considered a synonym of *Onychium japonicum*. In 1934, Christensen and Ching, working entirely independently, came to opposed conclusions. Christensen in the third supplement of the "Index Filicum" took up the name *O. lucidum* (D. Don) Spreng as a valid species, with *Onychium contiguum* (Wall.) Hope as a synonym. Ching on the other hand, recognized *O. contiguum* as a valid species and placed *L. lucida* as a variety of *O. japonicum*. Apparently neither Christensen nor Ching ever saw the type of *Leptostegia lucida*, but Ching was right in his placement. Don's type is not at all like the type of *Cheilanthes contigua* Wall., judging by two sheets of *Wallich* 72 in the U.S. National Herbarium. They represent a species with the blade very finely cut, with the ultimate segments linear, and the sori short. The type of *L. lucida* is like *Wallich* 69, which has broader segments and large sori, these mostly 5 mm. long or more. Ching is very likely right in considering this as merely a variety of *O. japonicum*, although further study may show that it is specifically distinct from the Japanese plants. The matter is complicated by numerous Chinese specimens, some of which resemble typical *O. japonicum* and some *O. lucidum*.

79. LOMARIA BIFORMIS Baker, Journ. Linn. Soc. London 15:415. Oct. 23, 1876. =**Blechnum biforme** (Baker) Christ, Farnkr. Erde 180. 1897.

Blechnum microbasis (Baker) C. Chr. var. *biforme* (Baker) Tardieu *in* Humbert, Fl. Madag. Fam. 5, 2:14. 1960.

TYPE: Antananarivo, Madagascar, April, 1876, *Pool* s.n. (holotype K, 2 sheets, Morton photographs 11422, 11423).

Lomaria biformis Baker has priority by four years over *L. microbasis* Baker (1880), and so Madame Tardieu has the names backward, since *biformis* should be the species and *microbasis* the variety. It seems somewhat doubtful if these species represent more than forms of each other, however, and so the following combination seems preferable: *Blechnum biforme* (Baker) Christ f. **microbasis** (Baker) Morton, comb. nov. (*Lomaria microbasis* Baker, Journ. Bot. Brit. & For. 18:328. 1880. Type: between Tamatave and Antananarivo, Madagascar, May, 1880, *L. Kitching* (holotype K, Morton photograph 11382; isotype B, Morton photograph 10193).

80. LOMARIA DECOMPSITA D. Don, Prodr. Fl. Nepal. 14. 1825. =**Onychium siliculosum** (Desv.) C. Chr. Ind. Fil. 468. 1906.

Pteris siliculosa Desv. Naturforsch. Freund. Berlin Mag. 5:324. 1811. Type said by Desvaux to be from South America, but Weatherby confirms (Contr. Gray Herb. 124:18. 1939) that it represents the Asiatic species known since the time of the "Index Filicum" as *Onychium siliculosum*, which had been generally called *Onychium auratum* Kaulf.

Pteris chrysocarpa Hook. & Grev. Icon. Fil. 1: *t. 107*. 1828. Syntypes: Nepal, *Buchanan-Hamilton*, and Katmandu, Nepal, *Wallich* (presumably K but possibly E). These two collections are doubtless duplicates of the same two collections that served as the syntypes of *Lomaria decomposita* D. Don. Hooker and Greville noted the similarity of their species to that of Don, but remarked that so careful an observer as Don would not have failed to describe the yellow coloration (but Don was not all that careful and, furthermore, his descriptions were very brief).

SYNTYPES: Narainhetty, Nepal, *Buchanan-Hamilton* (BM, Morton photograph 6696); Nepal, *Wallich* (not seen). The Buchanan-Hamilton specimen is here designated lectotype.

In the "Index Filicum," *Lomaria decomposita* D. Don is left as a dubious species, perhaps a synonym of *Onychium japonicum* (Thunb.) Kunze. It was correctly placed by Ching (Lingnan Sci. Journ. 13:495. 1934) as a synonym of *O. siliculosum;* however, Ching did not designate a lectotype.

81. LOMARIA MARGINATA Schrad. Goett. Gel. Anz. 1824:871. 1824. =**Lomariopsis marginata** (Schrad.) Kuhn *in* von Decken, Reise Ost-Afr. Bot. 3(3):22. 1879.

Acrostichum erythrodes Kunze, Flora 22(1): Beibl. 46. 1839. Type: Ilheos, Bahia, Brazil, *Martius* 366 (holotype presumably M; isotypes BR, Morton photographs 5077, 5078, and L, Morton photographs 2259, 2260).

Lomariopsis erythrodes (Kunze) Fée. Mém. Foug. 2:67. 1845.
Stenochlaena marginata (Schrad.) C. Chr. Ind. Fil. 624. 1906.
TYPE: Brazil, *Prince Neuwied* (holotype BR, Morton photograph 19838).

In the "Index Filicum," Christensen correctly placed *Lomaria marginata* Schrad. under *Stenochlaena*, and indicated *Acrostichum japurense* Mart. and *A. erythrodes* Kunze as synonyms, but for some unexplained reason in the first supplement he indicated that *L. marginata* was a *Blechnum*, and in the third supplement he equated it with *Blechnum regnellianum* Kunze with a query. It must be that a specimen in Copenhagen or Stockholm named *L. marginata* is really a *Blechnum*. But the holotype in Brussels is a *Stenochlaena*, or a *Lomariopsis* as Holttum now delimits these genera. The type itself is annotated by Kunze as equaling his own *A. erythrodes*, and Kuhn in his transfer of *L. marginata* to *Lomariopsis* also indicates that he has seen the type and that it is the same as *A. erythrodes*, which I can now confirm. In his brief synopsis of American *Lomariopsis* (Kew Bull. 1939:618. 1939), Holttum adopts the name *L. erythrodes*, presumably not having inquired further into the identity of *L. marginata* Schrad.[2] *Lomariopsis marginata* is confined to southern Brazil. The closely allied *L. japurensis* (Mart.) J. Smith of northern Brazil and the Guianas differs in having more numerous and closer veins in the sterile pinnae.

82. LOMARIA PYROPHILA Blume, Enum. Pl. Jav. 202. 1828. =**Blechnum pyrophilum** (Blume) Morton, comb. nov.
TYPE: Summit of the volcano, Ternate, August, 1821, *Reinwardt* 1712 (holotype L, Morton photograph 731).

This species was considered as possibly the same as *Lomaria vestita* Blume in the "Index Filicum," and also in Backer and Posthumus, but the type shows that it is different in its fewer pinnae, these rounded at the apex and not long acuminate, in its thicker texture, and in its dark rhachis, this only sparingly scaly. The type of *L. vestita* is also in Leiden (Java, *Blume*, Morton photograph 732); it shows a much larger plant of thin texture, the pinnae being elongate and long-acuminate, and the rhachis pale and densely scaly. *Lomaria vestita* Blume var. β (Blume. Enum. 203) from Mount Tjerimai, Java, *Blume* (Morton photograph 733) is less scaly and has the veins not raised beneath, but it is doubtless a form of the same species. The proper status of *L. vestita* remains to be determined; it is close to *Blechnum procerum* (Forst. f.) Swartz, of which it may be a geo-

[2] Although I have not seen the types, it seems likely that *Lomariopsis speciosa* Holttum (loc. cit. Type: Bahia, *Luschnath*) is the same as *L. elongata* Fée (Mém. Foug. 2:67. 1845, also described from Bahia, *Luschnath*), which Holttum does not compare it with. At least, from the description I cannot distinguish them.

graphical race. It is rather unfortunate that the name *Blechnum pyrophilum* is so much like *B. pyrophyllum* Blume, but I think that they must be considered different names, because they have different derivations and meanings and because they differ in spelling by two letters. The epithet "*pyrophila*" was evidently chosen because of the plant having been found growing by the crater of the volcano on Ternate Island.

83. LOMARIA XIPHOPHYLLA Baker, Journ. Bot. Brit. & For. 22:142. 1884. =**Blechnum biforme** var. **xiphophyllum** (Baker) Morton, comb. nov.
Blechnum xiphophyllum (Baker) C. Chr. Ind. Fil. 161. 1905.
Blechnum simillimum var. *xiphophyllum* (Baker) Tardieu *in* Humbert, Fl. Madag. Fam. 5, 2:11. 1960.
SYNTYPES: Madagascar, *Humblot* 257 and 442 (K, Morton photographs 11391, 11392, 11393).

Following Madame Tardieu, it seems best to consider this plant as only varietally distinct from *B. biforme*, which Madame Tardieu calls *B. simillimum*.

84. LYCOPODIUM CRASSINERVIUM Desv. Ann. Soc. Linn. Paris 6:190. 1827. =**Selaginella crassinervia** (Desv.) Spring. *in* Mart. Fl. Bras. 1(2):120. 1840.
Lycopodium brasiliense Raddi, Pl. Nov. Bras. Nov. Gen. 82, *t. 1, f. 1.* 1825.
Lycopodium pallidum Beyrich ex Gaud. *in* Freyc. Voy. Bot. 1:285. 1827. Not definitely accepted by the publishing author, Gaudichaud, and therefore not validly published.
Selaginella muscosa Spring *in* Mart. Fl. Bras. 1(2):120. 1840. Type: Macahé, Sebastianopolis, Brazil. *Luschnath* (presumably BR or M, not seen).
Selaginella brasiliensis (Raddi) A. Braun, Ann. Sci. Nat. Paris V, 3:290. 1863, non Spring, 1838.
TYPE: "Habitat in Brasilia."

In Alston's "The Brazilian species of Selaginella" (Repert. Sp. Nov. Fedde 40:313. 1936) the earliest available epithet *crassinervia* was rejected, apparently on the ground that the type specimen is infected with a fungus. This is true and was even noted in the original description by Desvaux, but this does not mean that the name is based on a "monstrosity" and so must be rejected. Many plants are affected more or less by fungi, but if this does not cause so much distortion that the plant is unidentifiable (as in a "witches' broom"), the names are legitimate. Therefore the name *S. crassinervia* should be restored for the common south Brazilian species and the name *S. muscosa* considered a synonym. For additional synonymy, see Alston.

85. **Meniscium puncta lunulatum** L. C. Rich. Act. Soc. Hist. Nat. [Paris] 1:114. 1792.

In the "Index Filicum" this is indicated as a validly published but dubious species, but there is no such thing. The words "*puncta lunula-*

tum" are merely the first words of Richard's generic description of *Meniscium*.

86. MENISCIUM SCREBERI L. C. Rich., Act. Soc. Hist. Nat. [Paris] 1:114. 1792. =**Thelypteris reticulata** (L.) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:63. 1953.

In the "Index Filicum" this is indicated as a nomen nudum, but it is not. The genus *Meniscium* Schreber dates from 1791 and Richard must have known of it even though he does not cite a reference to it, for he is unlikely to have invented the generic name independently. In fact, it is quite evident that he did know of Schreber's work, for he names the species after him, misspelling the specific name as "screberi." Schreber himself did not name a species, and Richard was providing a name. He cites for *M. screberi* "Plumier Fil. *t. 110*," and since Plumier had both a plate and a full description the species *screberi* is validly published by reference to this "pre-Linnaean" description, which refers to the plant described later as *Polypodium reticulatum* L.

87. MICROLEPIA INCISA Fée, Gen. Fil. 328. 1852. =**Dennstaedtia obtusifolia** (Willd.) Moore, Ind. Fil. 306. 1861.
TYPE: Gmadeloupe, *L'Herminier* (Herb Mougeot).

In the "Index Filicum" *Microlepia incisa* Fée is regarded as a dubious and unplaced species. The present location of the Mougeot fern herbarium has not been ascertained, although Dr. Lellinger has followed several leads. There is in Paris a L'Herminier specimen from Guadeloupe (Morton photograph 21327) that has a label in Fée's own hand with the name *Microlepia incisa* Fée. It came from the Houllet Herbarium. I do not know anything about B. Houllet (1815–1890), whose herbarium is now partly in Paris and partly in Brussels, but it seems possible that the specimen of this species from the Mougeot Herbarium (or the whole Mougeot Herbarium?) came to Houllet, and that this specimen is actually the holotype of *M. incisa*. In any case it can be considered the lectotype until another specimen is discovered. It represents the same species as that later described (in 1866) by Fée as *Dicksonia incisa* Fée, Fée having apparently chosen the epithet "*incisa*" independently for both the *Microlepia* and the *Dicksonia*. The latter is *Dennstaedtia incisa* (Fée) Kuhn, which Tryon considers to be synonymous with *D. obtusifolia*; it is perhaps not quite identical and it may be that the material from the Lesser Antilles deserves some taxonomic recognition.

88. MICROSORIUM LONGISSIMUM Fée, Gen. Fil. 268. *t. 20B*, *f. 2*. 1852. =**Polypodium myriocarpum** Mett. Abhandl. Senckenb. Naturforsch. Gesell. 2:105. 1856.
Phymatodes myriocarpa Presl, Tent. Pterid. 198, *t. 8*, *f. 12*. 1836, nom. nud.
Drynaria longissima J. Smith. Journ. Bot. 3:397. 1841, nom. nud.

Type: Luzon, *Cuming* 66 (isotype FI Morton photograph 16016).

Under the genus *Microsorium*, the name *M. longissimum* Fée is correct, but the epithet *longissimum* is not available under *Polypodium* because of *P. longissimum* Blume (1828). The basis of Presl's *Phymatodes myriocarpa* is unknown, but very likely it was a Haenke collection from the Philippine Islands; there is no description, and the figure given is an analysis only rather than the figure with analyses which would be required for valid publication. *Polypodium myriocarpum* Mett. was validly published with a description; it was based partly on *Cuming* 66 and partly on a Mérat collection from Cochin China. In the "Fern Flora of the Philippines," Copeland placed *Drynaria rubida* J. Smith as a synonym of *Microsorium longissimum* Fée, but this is wrong, a confusion with the quite different *Polypodium longissimum* Blume, of which *D. rubida* has been considered a synonym. The true identity of *D. rubida* remains to be established; it was originally a nomen nudum but was validly published as *Polypodium rubidum* Kunze, later, although Kunze included in his species material from Java collected by Zollinger as well as the original Cuming material of *D. rubida* J. Smith. A second sheet of *Cuming* 66 at Firenze (Morton photograph 16015) shows a form with deeply lobed blades; it is just a monstrosity or possibly is a hybrid with one of the regularly pinnatifid species.

89. **Nephrodium sparsum D. Don, Prodr. Fl. Nepal. 6. 1825. =Dryopteris sparsa (D. Don) Kuntze, Rev. Gen. Pl. 2:813. 1891.**

Polypodium sparsum Buch.-Ham. mss. ex D. Don, loc. cit.

Aspidium sparsum (D. Don) Spreng. _in_ L. Syst. Veg. ed 16, 4:106. 1827.

Aspidium densum Wallich, Num. List no. 390. 1829, nom. nud. Based on Nepal, _Wallich_ in 1821 (presumably E. Ind. Co. Herb., K).

Lastrea sparsa (D. Don) Moore, Ind. Fil. 104. 1858.

Aspidium densum Wallich ex Mett. Abhandl. Senckenb. Naturf. Gesell. 2:349. 1858, pro parte, at least as to _Wallich_ no. 390. Mettenius cited as synonyms _Aspidium catophoron_ Kunze (1848) and _Aspidium weigleanum_ Kunze (1851), both of which were legitimate and available names. _Aspidium densum_ Wallich was therefore an unnecessary name, superfluous and illegitimate by Art. 63 of the Code. _Aspidium densum_ Wallich ex Mett. is therefore to be typified as a renaming of the oldest available name that ought to have been adopted, namely _Aspidium catophoron_ Kunze and based on the same type as that. _Nephrodium densum_ D. Don was cited not as a straight synonym but as a variant or perhaps possible synonym, according to Mettenius' usual way of disposing of names that were doubtful or unknown to him.

Type: Suembu, Nepal, May 15, 1802, *Buchanan-Hamilton* (holotype BM, Morton photograph 6448).

This species has generally been understood correctly, as by Ching in his treatment of Sikkim–Himalaya *Dryopteris* (Bull. Fan. Mem.

Inst. Biol. Bot. 8:470. 1938), at least as to plants from Nepal and the Himalayas. The species is variable and possibly an aggregate in the wide range stated by Ching—India, Japan, Formosa, China, Indo-China, Philippine Islands, Malesia, and Polynesia.

90. NEPHRODIUM SUBFUSCUM Baker *in* Hook. & Bak. Syn. 267. 1867. =**Thelypteris leprieurii** (Hook.) Tryon, Rhodora 69:6. 1967.
Dryopteris subfusca (Baker) Kuntze, Rev. Gen. Pl. 2:813. 1891.
TYPE: Cayenne [French Guiana], *Leprieur* 23 bis (holotype K!).

In his monograph of *Dryopteris* (p. 167), Christensen remarked on this species and indicated that the type could not be located at Kew; it is there, however, with the name on a label at the side of the sheet where it could be easily overlooked. The name *Nephrodium leprieurii* Hook. var. α is also on the sheet in Hooker's hand, and it is indeed possible that this same sheet is also the type of Hooker's species, although I think not. Hooker says that his plant was collected in marshy woods of central French Guiana by Leprieur, but there is no information of this sort on this sheet. Moreover, Hooker comments especially on the false vein recurrent from the sinus [typical of this section *Steiropteris*], but this vein is not evident on this specimen.

Baker's *N. subfuscum* may indeed be a different species from *T. leprieurii*, for it differs not only in the absence of the recurrent false vein, but in having a rhachis that is only slightly pubescent (rather than densely short villous as in *leprieurii*), and fewer pairs of veinlets (about 8 pairs in *subfuscum* and about 12 pairs in *leprieurii*, according to Baker, Syn. Fil. 266). Still, *T. leprieurii* appears to be a variable species, at least as treated by Christensen, and Hooker's var. β from Peru appears even more different than *subfuscum*.

91. NEPHROLEPIS TRICHOMANOIDES J. Smith ex Presl, Epim. Bot. 44. 1849 [1851]. =**Arthropteris palisotii** var. **trichomanoides** (J. Smith ex Presl) Morton, comb. nov.
SYNTYPES: Luzon, *Cuming* 101 and Java, *Zollinger* 2812. Since the name was attributed to J. Smith, the Cuming specimen is the suitable lectotype, for it was named by Smith. This specimen is presumably in the Presl Herbarium in Prague, but it is not mentioned in Holttum's recent paper on the Presl types that he found. There are two isolectotypes in Paris (Morton photographs 3613, 3614).

The proper citation for this species is omitted in the "Index Filicum" and its supplements; at the reference cited there, "J. Smith in Hook. Journ. Bot. 3:413. 1841," the name is a nomen nudum. In Copeland's "Fern Flora of the Philippines," *N. trichomanoides* is placed as a synonym of *Arthropteris obliterata* (R. Brown) J. Smith, but the basis of that (*Nephrodium obliteratum* R. Brown) is actually a *Nephrolepis*, the identity of which is being studied by Dr. Jarrett. The

Philippine specimens in general have the pinnae smaller and narrower (often only 4–7 mm. wide) than in the typical African specimens of *A. palisotii*, and they are often obviously crenate rather than entire or subentire. They can conveniently be recognized as a variety. The holotype of *Aspidium palisotii* Desv., from Oware, Nigeria, Africa, *Palisot de Beauvois*, is in the Desvaux Herbarium in Paris (Morton photograph 3620); it consists of a piece of rhizome with one frond attached and a broken part of another frond; it is likely that this was removed from the holotype sheet of *Aspidium ramosum* Palisot de Beauvois (Fl. d'Oware 2:54, *t. 91, f. 1.* 1818), which is a better specimen with six fronds attached to a rhizome, one of these broken in a way that suggests that the broken fragmentary frond on the Desvaux type was removed from this sheet (Morton photograph 3619). There is a good isotype of *A. palisotii* in the Jussieu Herbarium (Cat. 1106, Morton photograph 2955).

92. PHEGOPTERIS ATROVIRIDIS van Alderw. van Rosenb. Bull. Jard. Bot. Buitenzorg II, 16:26. 1914. =**Diplazium atroviride** (van Alderw. van Rosenb.) Morton, comb. nov.

Dryopteris atroviridis (van Alderw. van Rosenb.) C. Chr. Ind. Fil. Suppl. 2:13. 1917. At this place, Christensen attributes this combination to v. A. v. R., but van Alderwerelt published it only as a synonym and did not accept it; therefore as an accepted combination it must be attributed to Christensen himself.

TYPE: Gunong Tanditat, Sumatra, in a damp ravine at 6,000 feet elevation, Jan. 21, 1913, *C. G. Mathew* 678 (holotype presumably BOG; isotype K, Morton photographs 18912, 18913, 18914).

From the isotype at Kew, this is clearly not a *Phegopteris* or *Dryopteris* but a *Diplazium*, one of the compound-leaved types. The middle pinnae closely resemble those of *D. polypodioides* Blume, but the lower are quite unlike, being tripinnate, with the ultimate segments elongate and strongly lobed. It is a distinct species thus far known only from the type collection.

93. PITYROGRAMMA TARTAREA var. FALLAX Domin. Věstn. Král. České Spol. Nauk, Tř. Mat. 1941(15):8. 1942. =**Pityrogramma** × **distans** (Link) Domin, Rozpr. České Akad. II, 38(4):49. 1929.

TYPE: "Mexico: San Marcos, *M. E. Jones* 21. VI. 1892, no. 513*a* (H. Dom. ex Nat. H. Wash.)."

I have received on loan from Pomona College, through the kindness of Dr. Lyman Benson, the specimens of *Jones* 513 and 513a, both of which bear the same data. *Jones* 513 is small and juvenile but rather typical *P. tartarea* (Cav.) Maxon. *Jones* 513a, the isotype of var. *fallax*, is a large, mature specimen that agrees with Domin's description and comments. This specimen is designated lectotype. There is in

the U.S. National Herbarium a specimen with the same data and with the number 513; this does not agree with *Jones* 513 in Pomona College but rather with 513a, and it is thus an isotype of var. *fallax*, and an "isolectotype."

Domin's var. *fallax* is not typical *P. tartarea*, for the specimen differs in aspect, in the more oblique pinnae and segments, the more acuminate pinnae, and the softer texture. It appears to represent a hybrid between *P. calomelanos* and *P. tartarea*, which is known as *Pityrogramma* × *distans* (Link) Domin. The original *Gymnogramma distans* Link was not considered by Link as a hybrid; it was based on cultivated material in the botanical garden in Berlin of unknown origin. From the illustration of an isotype of *G. distans* given by Domin in his paper on hybrid *Pityrogramma*, it appears that he is right in considering this taxon as representing the hybrid *P. calomelanos* × *tartarea*. This photograph agrees quite well with var. *fallax*, which probably represents a naturally occurring hybrid. The two species *P. calomelanos* and *P. tartarea* are both common and frequently grow in the same areas, and so natural crosses are to be expected.

94. POLYPODIUM ARGYRATUM Bory ex Willd. *in* L. Sp. Pl. ed. 4, 5:175. 1810. =**Grammitis argyrata** (Bory) Morton, comb. nov.
Ctenopteris argyrata (Bory) Tardieu, Notul. Syst. 15:445. 1959.
TYPE: Bourbon Island [Réunion], *Bory* (holotype B, Herb. Willd. no. 19660, microfiche photograph US).

The holotype is a poor specimen, a single detached frond lacking a rhizome. It agrees with a topotype collected in Bourbon by Commerson (P, Herb. Jussieu cat. 1091, right-hand plant, Morton photograph 2946). In their white-ceraceous blades and spongy texture, this species and two others of the Mascarene Islands and Madagascar show a clear and unexpected relationship to several tropical American species such as *Grammitis curvata* (Swartz) Ching, and the following allied species: *G. amylacea* (Copel.) Morton, *G. fragillima* (Copel.) Morton, *G. herrerae* (Copel.) Morton, and *G. subcrassa* (Copel.) Morton.

95. POLYPODIUM ATHYRIOIDES Hook. Sp. Fil. 4:224, *t. 277 B*. 1862. =**Grammitis athyrioides** (Hook.) Morton, comb. nov.
Ctenopteris athyrioides (Hook.) Copel. Phil. Journ. Sci. 84:406. 1955.
TYPE: Pangoa, Peru, *Mathews* 1103 (K).

This distinctive species has been known only from the type and two other collections: Río Lachac, Valle de Lares, Cuzco, Peru, *Bües* 1822 (US), and Cerros Calla Calla, 26 km. above Leimebamba, on the road to Balsas, Province of Chachapoyas, Department of Amazonas, Peru, 3360 m., *Hutchison & Wright* 6988 (UC). Superficially, this species rather resembles *Polypodium chochetangense* Rosenst., but this is an

instance of a parallel evolution apparently, for the latter belongs in *Polypodium* subg. *Polypodium* in the group of *P. pectinatum* L. The rhizome of *Grammitis athyrioides* has been unknown until the recent collection of Hutchison and Wright. It is short-creeping and about 2 mm. in diameter. The rhizome scales are abundant. They are castaneous, 3–4 mm. long, 0.5–0.6 mm. broad near the base, narrow-lanceate, acuminate, clathrate, the cells in about 8 rows near the base, the cells toward the apex of the scales with thickened walls and obscure lumina, and the scale margins with several conspicuous, brown, stiff, one-celled setae 0.3–0.4 mm. long.

96. POLYPODIUM BINERVE Hook. Sp. Fil. 4:175, *t. 273 B.* 1862. **=Blechnum binerve** (Hook.) C. Chr. Cat. Pl. Madag. Pterid. 44. 1932.
Lomaria simillima Baker, Journ. Bot. Brit. & For. 22:141. 1884.
Type: Madagascar, *Humblot* 307 (K).
Lomaria stenophylla Baker, Journ. Bot. Brit. & For. 22:142. 1884. Type: Madagascar, *Humblot* 305 (K, Morton photograph 11302).
Blechnum simillimum (Baker) Diels *in* Engl. & Prantl, Nat. Pflanzenfam. 1(4) :248. 1899.
Blechnum humblotii C. Chr. Ind. Fil. 155. 1905. Based on *Lomaria stenophylla* Baker, 1884, non Klotzsch, 1847.
Blechnum simillimum f. *binerve* (Hook.) Tardieu *in* Humbert, Fl. Madag. Fam. 5, 2:11. 1960.
TYPE: Madagascar, *Lyall* (holotype K, Morton Photograph 11303).

Madame Tardieu reduced *Blechnum binerve* to a form of *B. simillimum*, but that may not be, for the basionym *Polypodium binerve* Hook. dates from 1862, whereas the basionym of the other, *Lomaria simillima* Baker, dates from 1884. Doubtless she was influenced not by the dates of publication of the species but because *P. binerve* Hook. was based on juvenile plants. The fact that the type of a species is juvenile, however, does not mean that the species loses its priority. It is rather unfortunate perhaps that the type of the species should be an atypical, juvenile plant, but that cannot be helped. Since the juvenile and mature forms of the same species cannot be recognized as different forms, it follows that *Lomaria simillima* is a synonym of *B. binerve*. *Lomaria stenophylla* Baker was based also on a juvenile plant of this species.

97. POLYPODIUM CONJUNCTISORUM Baker, Ann. Bot. 8:129. 1894. **=Grammitis conjunctisora** (Baker) Morton, comb. nov.
?*Polypodium roemerianum* Rosenst. Nova Guinea 8:725. 1912. Lectotype: Hellwig Mountains, Dutch New Guinea, 1600–2300 m., November 1909, *von Roemer* 1227. The other syntype in Leiden, *von Roemer* 741 (Morton photograph 1969) is a poor specimen bearing the same data as the lectotype; this sheet is annotated by Rosenstock and it is thus truly the syntype, the published number "744" being a typographical error. The

true 744 is a quite different plant, cited by Rosenstock (op. cit. p. 727) as *Polypodium rupestre* Blume var. *leucolepis* Rosenst.

Xiphopteris conjunctisora (Baker) Copel. Phil. Journ. Sci. 81:94. 1952.

Type: Mount Suckling, New Guinea, *Macgregor* (holotype K, not seen).

98. Polypodium flocculosum D. Don, Prodr. Fl. Nepal. 1. 1825. =**Pyrrosia flocculosa** (D. Don) Ching, Bull. Chin. Bot. Soc. 1:66. 1935.

Polypodium acrostichoides Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 1. 1825, in synon., non Forst. f., 1786.

Niphobolus flocculosus (D. Don) Spreng. *in* L. Syst. Veg. ed. 16, 4:45. 1827.

Cyclophorus flocculosus (D. Don) C. Chr. Ind. Fil. 199. 1905.

Type: Narainhetty, Nepal, Nov. 13, 1803, *Buchanan-Hamilton* (holotype BM, Morton photograph 6738).

This species has been generally understood. It was well described by Giesenhagen (Die Farngattung Niphobolus 125. 1901).

99. Polypodium hirsutissimum var. sericeum Mart. & Gal. Mém. Acad. Brux. 15:42. 1842. =**Polypodium rosei** Maxon, Contr. U.S. Nat. Herb. 17:594. 1916.

Type: Near Morelia, Michoacán, Mexico, *Galeotti* 6432 (holotype BR, Morton photograph 5024, left-hand plant and right-hand label).

In Maxon's revision of the group of *Polypodium squamatum*, this variety was overlooked. There is only one sheet at Brussels that could be the holotype. It contains two specimens—a large plant at the right that is *Polypodium pyrrholepis* (Fée) Maxon and a smaller plant that represents *P. rosei* Maxon. This smaller plant agrees with the brief diagnosis of Martens and Galeotti. The sheet bears two labels, which are mounted in such a way that they seem to refer to the wrong plants. The label for *Galeotti* 6432, from Morelia, is the one at the right, whereas the one at the left is *Galeotti* 6276 from Mirador, Veracruz, referring to the large plant of *P. pyrrholepis*. The labels must go this way because *P. rosei* does occur near Morelia, where the type of var. *sericeum* came from, and *P. pyrrholepis* does occur at Mirador, in Veracruz, but not near Morelia in western Mexico. Another sheet of *P. pyrrholepis* in Brussels from Mirador bears the number *Galeotti* 6432, evidently an error for *Galeotti* 6276.

100. Polypodium incanum var. fimbriatum Mart. & Gal., Mém. Acad. Brux. 15:36. 1842. =**Polypodium thyssanolepis** A. Braun ex Klotzsch, Linnaea 20:392. 1847.

Syntypes: Barranca, Guadalajara, Jalisco, Mexico, *Galeotti* 6438 and 6443. Weatherby stated (Contr. Gray Herb. 124:34. 1939) that he could not find either of these two numbers in the Galeotti Herbarium in Brussels, and he therefore indicated *Galeotti* 6443 in Paris as the suitable type (i.e., lectotype). But there is a collection of no. 6438 in Brussels from the Martens Herbarium. This agrees with the original description and is here designated lectotype, on the reasoning that a lectotype ought to be chosen from among the original syntypes rather than

from an isosyntype. It appears that no. 6438 is a mixture, for Weatherby states that the specimens under this number in Kew and Paris are different, being *P. polypodioides* var. *aciculare* Weatherby.

101. POLYPODIUM IRVINGII Kuhn, Fil. Afr. 147. 1868. =**Polypodium glaucophyllum** var. **irvingii** (Kuhn) Ballard, Kew Bull. Misc. Inf. 1937:348. 1937.

Polypodium glaucophyllum var. β Hook. Sp. Fil. 5:18. 1864. Based on *Irving* 41 from Abbeokuta, Nigeria, Africa.

TYPE: Abbeokuta, southern Nigeria, *Irving* 41 (K, holotype, Morton photograph 13895.)

In the "Index Filicum," *P. irvingii* Kuhn is indicated as a "nomen." Kuhn, however, cited *P. glaucophyllum* var. β Hook. as the basis of the species, and since Hooker did give a description of his var. β, the name *P. irvingii* Kuhn must be considered as validly published by a reference to this description and not as a nomen nudum. In proposing var. *irvingii*, Ballard indicated this as a new variety with himself as author; but since he cites *P. irvingii* Kuhn as a synonym, this must be considered as a transfer rather than a new variety, and the authority should be "(Kuhn) Ballard."

102. POLYPODIUM LIGUSTIFOLIUM Poir. *in* Lam. Encycl. Méth. 5:553. 1804. =**Rumohra adiantiformis** (Forst.) Ching, Sinensia 5:70. 1934.

TYPE: Buenos Aires, Argentina, *Commerson* (holotype P, Herb. Lam., Morton photograph 17237).

In the "Index Filicum," *Polypodium ligustifolium* Poir. was referred to the synonymy of *Polystichum denticulatum* (Swartz) J. Smith, which is now generally known as *Arachniodes denticulata* (Swartz) Ching (Acta Bot. Sinica 10:260. 1962). Christensen in his monograph of American *Dryopteris* (Dansk. Vid. Selsk. Skrift. VIII, 6:126. 1920) listed *P. ligustifolium* among the "Species Inquirendae," with the remark that it was probably *Polystichum adiantiforme* sens. lat. The type in the Lamarck Herbarium shows that this is right, for it is identical with specimens of *Rumohra adiantiformis* collected near Buenos Aires by others. This variable species is widespread throughout the world; possibly someone may be able to distinguish segregates sometime. In that case, *P. ligustifolium* will not be the earliest name for the Argentine plant, for it is antedated by *Tectaria calaguala* Cav. (Descr. 252. 1802), described two years previously also on material from Buenos Aires. In the Jussieu Herbarium (Cat. no. 1197B, Morton photograph 2996) is another specimen labeled *P. ligustifolium*, but not by Poiret. It is a sterile specimen from Montevideo, Uruguay, also collected by Commerson, and represents the same species as the Buenos Aires collection; it is, however, not a type. There are in Firenze two specimens determined as *P. ligustifolium* that appear to be authentic; they are labeled as having been collected by Commerson in the

Ile de France, i.e., Mauritius, but doubtless they were also really collected either near Buenos Aires or Montevideo (Morton photographs 16476–78).

103. Polypodium medicinale Rojas, Bull. Acad. Géogr. Bot. [Le Mans] 28:156. 1918. =Polypodium phyllitidis L.

In the "Index Filicum," Supplement III, the species is left as dubious. The original description is as follows:

Radice fibrosa, gracili, tereti; fronde simplici, subcoriacea, angustato, elongato, integro, glabro, acuminato, basi attenuato, subtus reticulatovenoso, bipedali et ultra; soris sparsis.

Forêts et sur les vieux troncs, près de Cangayam Quitilipi. Intermédiaire entre *P. taeniosum* H. B. et *P. crassifolium* de la Jamaique et du Venezuela.

Remède populaire aux missions du Corrientes du temps de Bonpland.

An inquiry to the Jardin Botánico in Asunción, where the type is doubtless conserved, was without response. The species, however, is identifiable from the description by the process of elimination, for *Polypodium phyllitidis* L. is the only epiphytic species in Paraguay with scattered sori and elongate, simple, entire, glabrous blades two feet long and more. N. Rojas Acosta gave the common name as "Calaguala," a name commonly applied to *P. phyllitidis* and other species of *Polypodium* with simple blades, as well as apparently to various glabrate species of *Elaphoglossum* also, the blades of which resemble *Polypodium* casually.

104. Polypodium normale D. Don, Prodr. Fl. Nepal. 1. 1825.

Phymatodes normalis (D. Don) K. B. Presl, Tent. Pterid. 196. 1836.

Polypodium longifrons Wallich, Num. List. no. 274. 1829, nom. nud.

Polypodium longifrons Wallich ex Hook. & Grev. Icon. Fil. 1:*t. 65.* 1829. Syntypes: "India orientalis," *Wallich;* Nepal, *Buchanan-Hamilton.* Since the specific epithet was adopted from Wallich, I designate the Wallich specimen (K) as lectotype.

Drynaria longifrons (Wallich ex Hook. & Grev.) J. Smith, Journ. Bot. Hook. 3:397. 1841.

Drynaria normalis (D. Don) J. Smith, Journ. Bot. Hook. 4:61. 1841.

Pleopeltis normalis (D. Don) Moore, Ind. Fil. 347. 1862.

Pleopeltis longifrons (Wallich ex Hook. & Grev.) Moore, Ind. Fil. 346. 1862.

Colysis normalis (D. Don) J. Smith, Hist. Fil. 100. 1875.

Microsorium normale (D. Don) Ching, Bull. Fan. Mem. Inst. Biol. Bot. 4:299. 1933.

Neolepisorus normalis (D. Don) Ching, Bull. Fan. Mem. Inst. Biol. Bot. 10:13. 1940.

Neocheiropteris normalis (D. Don) Tagawa, Journ. Jap. Bot. 27:217. 1952.

TYPE: Nepal: *Buchanan-Hamilton* (holotype BM, a single frond mounted at left on same sheet as the holotype of *Polypodium scolopendrium* Buch.-Ham. ex D. Don, Morton photograph 7612).

From the fact that this species has been referred to so many different segregate genera—*Phymatodes*, *Pleopeltis*, *Colysis*, *Microsorium*, *Neolepisorus*, and *Neocheiropteris*—one might assume that this is very strange species of uncertain relationships, but actually it is rather nondescript without any very distinctive characters. I would suppose that the latest combination proposed, under *Neocheiropteris*, is probably right if one accepts all the microgenera suggested. Two species may be passing as *P. normale;* the type has the sori irregularly scattered in two or three rows, but there are some plants referred to *P. normale* in which the sori are strictly in a single row.

105. Polypodium oxylobum Wall. ex Kunze, Linnaea 24:255. 1851.

Polypodium oxylobum Wallich, Num. List. no. 294. 1829, nom. nud.

Phymatodes oxyloba K. B. Presl, Tent. Pterid. 196. 1836, nom. nud. Although no description had been published of *Polypodium oxylobum* Wallich or *Phymatodes oxyloba* K. B. Presl, Ching adopted the name as validly published by Presl in 1836.

Pleopeltis oxyloba (Wallich ex Kunze) Beddome, Ferns So. Ind. *t. 175.* 1863–65.

Pleuridium oxylobum (Wallich ex Kunze) J. Smith, Ferns Brit. & For. 96. 1866.

Polypodium hastatum Thunb. var. *oxylobum* (Wallich ex Kunze) Clarke, Trans. Linn. Soc. II, Bot. 1:563. 1880.

Phymatodes oxyloba (Wallich ex Kunze) Ching, Contr. Bot. Inst. Nat. Acad. Peiping 2:67. 1933. Wrongly attributed to Presl.

Crypsinus oxylobus (Wallich ex Kunze) Sledge, Bull. Brit. Mus. (Nat. Hist.) Bot. 2:145. 1960.

SYNTYPES: Nepal, *Wallich* 294; Emodo, near Mossuri, *Hügel:* Nilgiris, *Schmid-Koch* 5 and 151; Nilgiris, *Kurr.* The valid publication of *P. oxylobum* has generally been attributed to Mettenius, but Sledge pointed out that the species was published previously by Kunze. Sledge remarked that the species was based on collections by Wallich and Hügel and that Kunze also reported it from the Nilgiris, but this is a little misleading. Kunze adopted the name from Wallich, but he did not indicate a type and he referred the Schmid-Koch and Kurr specimens from the Nilgiris to the species without any question, and so they are as much a part of the protologue as the Wallich and Hügel specimens. Sledge removed these Nilgiris specimens to his new species *Crypsinus montanus*, thus leaving the Wallich and Hügel specimens to typify *P. oxylobum.* Since no lectotype has been formally designated, I choose Nepal, *Wallich* no. 294 in the East India Company Herbarium, Kew. Kunze's own original specimen was destroyed in Leipzig. Isolectotype, US.

The proper disposition of this species is a little doubtful to me. Sledge transferred it to *Crypsinus* without any question. But it seems to me that if *Crypsinus* can be maintained as a group it can only be on the character of the notched margins of the blades, as it is keyed out in Copeland's key to Polypodiaceae in his "Genera Filicum" and as is required by Copeland's description of *Crypsinus.* Copeland did include two species with entire margins in his *Crypsinus*, noting them as aber-

rant, but their inclusion was not justified by any arguments. Copeland did not mention *P. oxylobum*, and he presumably included it in *Microsorium*, which in his opinion included *Phymatodes*. The supposed relationship between *P. oxylobum* and *P. hastatum* Thunb., a true *Crypsinus*, is not obvious, even though Clarke had the former as a variety of the latter. There is perhaps sufficient likeness in a general way to *Polypodium scolopendrium* Burm. f. to indicate that that might indeed be the relationship.

106. Polypodium parvulum Bory ex Willd. *in* L. Sp. Pl. ed. 4, 5 :182. 1810.
=Grammitis parvula (Bory) Morton, comb. nov.
Ctenopteris parvula **(Bory)** J. Smith, Hist. Fil. 185. 1875.
Type: Bourbon [Réunion], ***Bory*** **(B, not seen; isotype FI, Morton photograph 16017).**

This species belongs in *Grammitis* sect. *Cryptosorus* (Fée) Fourn. (cf. Morton, Contr. U.S. Nat. Herb. 38 :90. 1967) but is less deeply pinnatifid than most species of the section. It is probably confined to the Mascarene Islands, although it has been reported from Africa. It is given the wrong citation of "*Ctenopteris parvula* (Willd.) Tardieu, Notul. Syst. 15 :445. 1959" in the fourth supplement of "Index Filicum"; this combination was validly published by J. Smith in 1875.

107. Polypodium platynotus Kunze ex Zollinger, Syst. Verz. Ind. Arch. 1842–48 :37. 1854. =Prosaptia alata (Blume) Christ, Ann. Jard. Buitenzorg II, 5 :127. 1905.

In the "Index Filicum" this is listed as though it were a validly published but dubious species, and in Backer and Posthumus' "Varenflora voor Java" (p. 210. 1939) it is given as a synonym of *Polypodium obliquatum* Blume. This was, however, originally a nomen nudum only, based on *Zollinger* 3012, from Mount Salak, Java. A specimen in Brussels (Morton photograph 20966) is authentic, for it has the right data and the name is in Kunze's own hand. This specimen shows that the plant is not at all a synonym of *P. obliquatum* Blume, but rather is identical with *Prosaptia alata* (Blume) Christ.

108. Polypodium propinquum Wallich ex Mett. Abhandl. Senckenb. Naturf. Gesell. 2 :120. 1856. **=Drynaria propinqua** (Wallich ex Mett.) J. Smith, Cat. Cult. Ferns 13. 1857.
Polypodium propinquum **Wallich, Num. List. no. 293. 1829, nom. nud.**
Phymatodes propinqua **K. B. Presl, Tent. Pterid. 198. 1836, nom. nud.**
Drynaria propinqua **J. Smith, Journ. Bot. Hook. 4 :61. 1841, nom. nud.**
Type: Nepal, Wallich List no. 293 (presumably holotype B; isotype US)

In the "Index Filicum," the combination *Drynaria propinqua* is attributed to J. Smith in 1841, but obviously it is impossible to have a valid combination published in 1841 prior to the valid publication of

the basionym in 1856. J. Smith republished the combination in 1857 shortly after Mettenius had provided a description. He did not refer to Mettenius, but the basis of his new combination is obvious.

109. POLYPODIUM PRUINATUM Baker *in* Hook. & Bak. Syn. Fil. ed. 2, 508. 1874, non Swartz, 1802. =**Grammitis pruinosa** (Maxon) Morton, comb. nov.

Polypodium pruinosum Maxon, Proc. Biol. Soc. Wash. 52:117. 1939. New name for *P. pruinatum* Baker, non Swartz.

Ctenopteris pruinosa (Maxon) Copel. Phil. Journ. Sci. 84:470. 1955.

TYPE: Chontales, Nicaragua, 1867–68, *Tate* 44 (holotype K, Morton photograph 15430). There is a fragment of the type collection in US, kindly sent by the Director of Kew to Dr. Maxon.

This apparently distinct species is still known only from the type collection. It is a small plant; the fronds are only 1–2 inches long, rather broad, and broadly round-lobed, each lobe having two sori. The blades have minute, white hairs on the upper surface, and the margins are obviously ciliate.

110. POLYPODIUM RADICANS Poir. *in* Lamarck, Encycl. Méth. 5:530. 1804, non Burm. f., 1768. =**Thelypteris reptans** (Gmel.) Morton *in* Steyerm. Fieldiana Bot. 28:12. 1951.

TYPE: From "Caroline merid." in Herb. Lamarck, Paris (Morton photograph 2691). The locality "Caroline merid.," i.e., South Carolina, is an error, and the specimen undoubtedly came from the West Indies.

The small stellate hairs present on the surfaces of the pinnae, both above and beneath, show that this species is a synonym of *Thelypteris reptans*, as it is currently recognized, although that may be an aggregate, since it is so highly variable. The present plant belongs to the form with elongate leaves radicant at the apex but with the upper pinnae (segments) all fully adnate. The more typical form has the upper pinnae all sessile or even short-petiolulate. Poiret cites *Polypodium rhizophyllum* Swartz as a synonym, but the species *P. radicans* Poiret may not be considered as based on that species, for in his comments Poiret says that he merely suspects that his species is the same as that of Swartz. The Poiret name is illegitimate, being a later homonym of *P. radicans* Burm. f., i.e., *Nephrolepis radicans* (Burm. f.) Kuhn.

111. POLYPODIUM SAFFORDII Maxon, Amer. Fern Journ. 2:19, fig. 1912. =**Grammitis saffordii** (Maxon) Morton, comb. nov.

Polypodium minimum Brack. U.S. Expl. Exped. 16:5, *t. 1, f. 3*. 1854, non Aublet, 1775.

TYPE: Mountains behind Honolulu, Oahu, Hawaiian Islands, *Wilkes Exped.* (holotype US).

This is a species of the sect. *Xiphopteris* endemic to the Hawaiian Islands, where, apparently, it is not uncommon.

112. **Polypodium scandens Léveillé & Rojas, Bull. Acad. Géogr. Bot. [Le Mans] 28:156. 1918. =Polypodium lycopodioides L. Sp. Pl. 1082. 1753.**

This species has been omitted from the supplements of the "Index Filicum," but I think it must be considered validly published. The entire publication is as follows: "Le Dr. Plukenet l'avait nommé *Dryopteris scandens jamaicensis*. It serait plutôt a rattacher au genre *Polypodium*: *P. scandens* Lévl. et Roj." This is thus a new species based on a reference to a pre-Linnaean publication of Plukenet.

The Plukenet reference is obviously to the Almagestum Botanicum 156, 1696, *t. 290*, *f. 3*. 1694, where the plant appears as *Filix sarmentosa bifrons s. Bryopteris* [*sic! = Dryopteris*] *scandens jamaicensis inter filicem et Lycopodium media*." Plukenet also quotes as a synonym *Phyllitis scandens cauliculis squamosis* Plumier *t. 42*, a reference to Plumier, Descr. Plant. Amér. 29, *t. 42*, 1693. Plukenet has no description, but the reference to Plumier's long description [reprinted and enlarged in Plumier, Tract. Fil. 104., *t. 119*. 1705] serves to validate the name *P. scandens* Lévl. & Rojas, which is a later homonym of *P. scandens* Forst. f. (1786).

The Plukenet figure and the Plumier plate both represent the species *Polypodium lycopodioides* L., and in fact both references were cited by Linnaeus in publishing this species in 1753. Since Linnaeus had additional material and cited additional references, however, *P. scandens* must be considered as a segregate rather than a simple renaming of the Linnaean species. The rather quaint and naive remark of Plukenet that the plant is intermediate between a fern and *Lycopodium* is due to the numerous spreading scales on the elongate rhizome; when the fronds have fallen, the rhizome thus resembles slightly the leaves and stem of a *Lycopodium*.

113. **Polypodium scolopendrium Buch.-Ham. ex D. Don. Prodr. Fl. Nepal. 1. 1825, non Burm, f., 1768 [as "scolopendria"]. =Polypodium leiopteris Kunze, Linnaea 23:279, 319. 1850. Syntypes: Cultivated from the East Indies (Hort. Van Houtte, 1848, and Hort. Lips., 1849, not seen).**

***Lepisorus excavatus* (Bory) Ching var. *scolopendrium* (Buch.-Ham.) Ching, Bull. Fan. Mem. Inst. Biol. Bot. 4:69. 1933.**

***Pleopeltis scolopendrium* (Buch.-Ham.) Alston & Bonner, Candollea 15:207. 1956.**

***Lepisorus scolopendrium* (Buch.-Ham.) Tagawa ex Hara, Fl. East. Himal. 494. 1966.**

Type: Nepal, *Buchanan-Hamilton* (holotype BM, Morton photograph 7612, right-hand plant; the left-hand plant is the holotype of *Polypodium normale* D. Don).

Polypodium scolopendrium was for a long time considered to be only a variety of the African *Polypodium excavatum* Bory, but recent authors Alston and Bonner, and Tagawa have considered it specifically

different. The epithet "*scolopendrium*" has been used, but to me it seems too close to the earlier *P. scolopendria* Burm. f., a conclusion with which Dr. Stafleu and Dr. Rickett agree. In my opinion *P. scolopendria* Burm. f., although validly published, is incorrect orthographically. It must have been proposed because of the similarity of the simple-bladed fronds to the European Hart's-tongue, *Scolopendrium vulgare*, but if so then the specific epithet ought to have been "*scolopendrium*," the old generic name unchanged. "*Scolopendria*" would be the same name in the plural; but specific epithets must be in the nominative singular, and so in my opinion the Burmann species ought to be corrected to *Polypodium scolopendrium* Burm. f., in which case Buchanan-Hamilton's later *P. scolopendrium* would be identical with it. But whether corrected or not the earlier *P. scolopendria* must make the later *P. scolopendrium* illegitimate. I have considered *P. leiopteris* Kunze the same on the authority of Ching; I have not seen any authentic material myself. The syntypes were doubtless destroyed in Leipzig.

114. Polypodium trichodes Houlston & Moore, Gard. Mag. Bot. Hort. Flor. Nat. Sci. 3:18. 1851.

Since the original publication of this species is in a rather uncommon periodical, I reproduce the description below:

An ornamental evergreen stove species from the East Indies. Fronds three to five feet high, hairy, terminal, adherent to a thick, creeping rhizome, bi-tripinnate, fragile, pale green, with linear-lanceolate pinnae, the pinnules pinnatifid, with somewhat ovate, bluntly lobed segments. Sori round, medial. Stipes and rachis covered with a fine powder; stipes scaly, especially near the rhizome. This fern is in cultivation under the name *Lastrea paludosa*.

The name is attributed to Reinwardt, but there is no real reason to do so. *Polypodium trichodes* Reinw. ex J. Smith, Journ. Bot. Hook. 3:394. 1841, was a nomen nudum, and there is reason to think that perhaps J. Smith interpreted Reinwardt's herbarium name wrongly. Apparently no one has ever really examined Reinwardt's original specimen to which he applied the name *trichodes*; it is presumably in Leiden, but it was not the basis for Smith's use of the name or Houlston and Moore's use either. The latter authors do not give the origin of their material, other than that it was cultivated, but Lowe (Ferns: Brit. & Exot. 2:*t.2*. 1872), who also describes the species and attributes it to Reinwardt, says that it appeared spontaneously at Kew in 1848.

Holttum (Blumea 17:28. 1969) states that the epithet *trichodes* was always a nomen nudum until used by Rosenstock as *Dryopteris trichodes* in 1917, but as shown above the epithet was validly published in 1851. The identity of Houlston and Moore's species, however, is not quite certain. I could not find any possible type at Kew, but there may

be one in Moore's own herbarium, also at Kew, which I did not consult, or there may be one at the British Museum (Natural History), which also has many plants from Moore's herbarium. Very likely, however, the species is a synonym of *Thelypteris torresiana* (Gaud.) Alston. *Dryopteris trichodes* Rosenst. was based on entirely different material. According to Holttum, the material was mixed, partly *T. torresiana* and partly a related species that he calls *Macrothelypteris polypodioides* (Hook.) Holttum. Holttum did not select a lectotype. Since Rosenstock stresses the soft hairs and the nonasperous rhachises, his name should apply to the *torresiana* element. Therefore, I designate Java, *Zollinger* 354 (L) as lectotype, which fixes *D. trichodes* as a taxonomic synonym of *T. torresiana*.

115. Polypodium trifidum D. Don, Prodr. Fl. Nepal. 3. 1825, non Hoffm., 1790. =Polypodium oxylobum Wall. ex Kunze, Linnaea 24 :255. 1851.

Type: Nepal, *Wallich* (holotype BM, with the name in the hand of Don, Morton photograph 7618). The type is the two small plants, trifid and bifid, in the lower left-hand corner; the other large, pinnatifid plants on the type sheet are also Nepal, *Wallich*, and are doubtless duplicates of the original specimens of *Polypodium oxylobum* Wallich.

116. Polypodium umbilicatum Poir. *in* Lam. Encycl. Méth. 5 :528. 1804. =?Dryopteris filix-mas (L.) Schott, Gen. Fil. ad *t. 9*. 1834, var.

Type: Ile de France [i.e., Mauritius], 1774, *Commerson* 131 (holotype Herb. Lamarck, P. Morton photographs 2680, 2681).

This species is mentioned here merely to point out the need for further study. In the "Index Filicum" it is referred to *Dryopteris filix-mas* (L.) Schott, but this species is not reported from Mauritius by Baker in his "Flora of Mauritius and the Seychelles" nor by Madame Tardieu in her list of the ferns of the Mascarene Islands. The type specimen shows that *P. umbilicatum* is indeed a close ally of the European *D. filix-mas*. It is perhaps the same as *D. paleacea* (Swartz) C. Chr. var. *madagascariensis* C. Chr. The proper name for the latter is doubtful, since *D. paleacea* (Swartz) C. Chr. (1911) is an illegitimate later homonym of *D. paleacea* (D. Don) Hand.-Mazzet. (1908).

117. Pteris amoena Blume, Enum. Pl. Jav. 210. 1828.

Type: Java, *Blume* (holotype L, with name in Blume's hand, Morton photograph 2158).

In the "Index Filicum" and in Backer and Posthumus' "Varenflora voor Java" (p. 179. 1939), *Pteris amoena* Blume is listed as a synonym of *P. biaurita* L., following Agardh (Rec. Gen. Pterid. 27. 1839), but Agardh placed it there only with a query, for he had not seen any material. The holotype in Leiden shows that *P. amoena* is not the same as *P. biaurita*, for the veins are free and not joined to form

costal areoles as they are in *P. biaurita*. In its broad pinnae with cuneate bases and rather broad costal wings (the pinnae not being cut to the base), venation, and other characters it agrees with *P. longipinnula* Wall. ex Agardh var. b of Holttum's "Ferns of Malaya" (p. 405. 1954), which differs from typical *longipinnula* in having the lowest pinnae basally forked. The typical *P. longipinnula*, with unforked basal pinnae, may be known as *Pteris amoena* var. **longipinnula** (Wall. ex Agardh) Morton, comb. nov. (*Pteris longipinnula* Wall. ex Agardh, Rec. Gen. Pterid. 19. 1839. Type: Penang, *Wallich* Cat. 108. Agardh saw two specimens of *Wallich* 108, one in the Hooker Herbarium and one in the East India Company Herbarium, both now at Kew. I designate the one in the Hooker Herbarium as the lectotype, the sheet bearing the indication "Wallich 1829," which is the date of receipt of the specimen and not the date of collection, which was 1822).

118. **Pteris aspericaulis** Wallich ex Agardh, Rec. Sp. Gen. Pter. 22. 1839.

Pteris aspericaulis Wallich, Cat. 107. 1828, nom. nud.

Pteris quadriaurita var. *aspericaulis* (Wallich ex Agardh) Bedd. Handb. Ferns Br. Ind. 111. 1883.

LECTOTYPE: The specimen of *Wallich* 107 in the general herbarium at Kew (Morton photograph 14805) is here designated lectotype. Agardh saw this sheet and also the sheet of *Wallich* 107 in the herbarium in the Linnean Society in London, which is now in the East India Company Herbarium at Kew. In the "Index Filicum" no description of *P. aspericaulis* is indicated until that of Hieronymus (Hedwigia 55:348. 1914), but Agardh accepted the species and gave a description in 1839.

119. **Pteris deltea** Agardh, Rec. Sp. Gen. Pter. 33. 1839.

The holotype is in the Hooker Herbarium at Kew, collected in Tahiti ("Otaheite") by Menzies (Morton photograph 14810). Agardh erroneously stated that it was collected by "Mathews."

120. PTERIS ENDLICHERIANA Agardh, Rec. Pterid. 66. 1839. =**Pteris comans** Forst. Prodr. Fl. Ins. Austr. 79. 1786.

TYPE: Agardh cited merely "Hab. in sylvaticis umbrosis Insulæ Norfolk (Hb. Hookeri!)." The only specimens in the Hooker Herbarium at Kew that could be the types are two collections from shady woods ["sylvaticis umbrosis"], Norfolk Island, *A. Cunningham* 39 and 60 (Morton photographs 14922, 14923). These are surely both syntypes, no. 39 being a blade apex (Agardh describes the upper pinnæ from this sheet) and no. 60 being four lower pinnæ (and Agardh describes these). Dr. Tindale has marked no. 39 as the "holotype," but it is clear that there is no holotype but two syntypes. I choose no. 60 as lectotype, because it is more identifiable, consisting of fully grown lower pinnæ, and especially because it has the name *endlicheriana* in the hand of Agardi; no. 39 does not have the name *endlicheriana* on it, only *Pteris comans*. Cunningham did not think his two collections the same species, for he wrote on no. 60 "Habit of no. 39 but distinct" and he may possibly be right. Agardh did not compare his new species with *comans* but with *berteroana*.

121. PTERIS INDICA Poir. (var. A) *in* Lam. Encycl. Méth. 5:712. 1804. =**Pteris vittata L.**

TYPE: Molucca Islands, *Labillardière* (holotype FI-Webb, Morton photograph 16404).

In the "Index Filicum," *P. indica* Poir. is considered dubious, a synonym of either *P. longifolia* L. or *P. moluccana* Blume. It was based on two specimens collected by Labillardière, and the other from the Moluccas; the latter is indicated and described as "variety A," without a varietal epithet. Both specimens must be considered as syntypes of *P. indica*, since they were included within the circumscription, but the one indicated as a variety cannot be the lectotype. The Java specimen that must be the lectotype of *P. indica* was cited by Poiret as being in the Desfontaines Herbarium, which is now incorporated in the Webb Herbarium in Florence, but I did not find it when I was there in 1967. It is doubtless there, however, but some doubt still remains whether it is properly *P. vittata* (*P. longifolia* in part of the "Index Filicum") or *P. moluccana*. One indication that it may be *P. moluccana* is provided by a specimen of *P. moluccana* collected on Didang Island, Indonesia, by Gaudichaud, and identified by him as *P. indica* Poir. (cf. Morton photograph 16408).

122. PTERIS NEVILLEI Baker, Ann. Bot. 5:219. 1891. =**Pteris pseudolonchitis Bory ex Willd. *in* L. Sp. Pl. ed. 4, 5:389. 1810. Type: Bourbon Island [=Réunion], *Bory* (isotype L, Morton photograph 2219).**

TYPE: Bourbon Island [=Réunion], *G. Neville* (holotype K, Morton photograph 14920).

This rather characteristic bipinnate-pinnatifid species of the section *Litobrochia* is confined to the Mascarene Islands. *Pteris nevillei* was recognized as a valid species in the "Index Filicum." It was overlooked in Madame Tardieu's list of the ferns of the Mascarene Islands (Notul. Syst. 16:162–164. 1960).

123. PTERIS PECTINATA D. Don, Prodr. Fl. Nepal. 15. 1825, non Cav., 1802. =**Pteris biaurita L. Sp. Pl. 1076. 1753, sens. lat.**

HOLOTYPE: Nepal, *Wallich* (BM, Morton photograph 6710). A specimen (US) of *Wallich* 106 from Nepal, originally identified as *P. nemoralis* Willd. by *Wallich*, agrees with Don's holotype and is in all probability an isotype. However, *Wallich* 106 at Kew is free-veined and is *P. quadriaurita* Retz., sens. lat.). Wallich ignored *P. pectinata* Don in his List.

There has been confusion about the identity of *Pteris pectinata* D. Don. Agardh placed it as a synonym of his *Pteris aspericaulis* Wallich,[3] not adopting Don's name because of its being a later homonym of

[3] ***Pteris aspericaulis*** **Wallich ex Agardh, Rec. Pterid. 22. 1839, is a validly published name that has never yet appeared in the "Index Filicum" or its supplements with its correct earliest citation. In the original "Index Filicum," the only**

(Continued)

P. pectinata Cav.[4] Agardh stated that he had seen an authentic specimen of *P. pectinata* in the herbarium of the Linnean Society of London, now the East India Company Herbarium at Kew. This specimen, however, is apparently not authentic, for *P. aspericaulis*, as described by Agardh, has free veins. The specimen in the British Museum (Natural History) with the name *P. pectinata* in Don's own hand is by no means the same thing; Don's description does not mention the venation, but this holotype shows that the venation is of the *Campteria* type, i.e., with a single transverse costal areole between the adjacent lateral midribs of the segments. Thus, *P. pectinata* D. Don is a synonym of *P. biaurita* L. in a broad sense, as it applies to specimens from Nepal and the Himalayas generally. This species is characterized also by having the lowest pair of pinnæ with a pectinate basal segment, by having raised veinlets beneath, and by entire segments. The holotype sheet bears also the identification *P. wallichiana* Agardh, but this is an error; the true *P. wallichiana* also has the venation of *Campteria*, but the blades are very large and pedately divided, the basal pinnæ being twice-parted. The veins are not raised beneath and the segments are toothed at the apex. The type of *P. wallichiana* is *P. umbrosa* Wall. List. no. 109. 1829, nom. nud., from Kumaon, India, *Wallich* in Herb. Hook. (K) and East India Company Herbarium (K). *Wallich* 109, however, is evidently a mixture, for the specimen distributed by the British Museum (Natural History) to the United States National Herbarium does not represent this species, but is *P. aspericaulis;* it is from Kumaon, collected by R. Blinkworth, and thus evidently misnumbered; it ought to be no. 106–6. A specimen in Leiden (Morton photograph 2171) distributed as *P. umbrosa* Wall. no. 109 is also free-veined; however, it is from Penang and represents the species called *P. asperula* J. Smith in Holttum's "Ferns of Malaya"; this sheet

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(Continued)
reference is to Wallich "List," no. 107. 1829, where it is a nomen nudum; in Supplement II, there is a reference to the later description of Hieronymus in 1914. *Pteris aspericaulis* cannot be considered as a renaming of *P. pectinata* D. Don, for as indicated Agardh misunderstood Don's species; the type must be a specimen that agrees with Agardh's description, namely Nepal, *Wallich* in Herb. Hooker (K) and Herb. Linn. Soc., i.e., East India Company Herbarium (K); the specimen in the Hooker Herbarium is here designated lectotype.

[4] *Pteris pectinata* Cav. is not a dubious species from the Mascarene Islands, as indicated in the "Index Filicum," but represents a species that occurs only in the Andes of South America, namely *Belchnum loxense* (H.B.K.) Hieron., the original locality being thus an error. (Cavanilles, however, did not indicate "Mascarene Islands" but "Marianna Islands," a very different place indeed.) (cf. C. Christensen, Ark. för Bot. 9(11) :43. 1910, and Dansk. Bot. Ark. 9(3) :22. 1937). Fortunately, the epithet *pectinata* cannot now be transferred to *Blechnum* because of the existence of *B. pectinatum* K. B. Presl (1825).

doubtless represents *Wallich* 106–2, which was identified by Wallich as *P. nemoralis* Willd., which is doubtless the alliance.

124. Pteris subquinata Wallich ex Agardh, Rec. Sp. Pter. 21. 1839.
Pteris subquinata Wallich, Cat. 104. 1828, nom. nud.
Pteris quadriaurita var. *subquinata* (Wallich ex Agardh) Bedd. Handb. Ferns Br. Ind. Suppl. 23, 1892.

Agardh accepted and described this species, but in the "Index Filicum" no description is indicated until that of Hope in 1901. Agardh saw specimens of *Wallich* 104 in the Hooker Herbarium and in the herbarium of the East India Company; the better of these two specimens should be designated lectotype.

125. Pteris tripartita Swartz var. **milneana** Hook. Sp. Fil. 2:226, *t. 138B*. 1858.
=Pteris milneana (Hooker) Baker *in* Hook. & Bak. Syn. Fil. 170. 1867.
Syntypes: "The same collectors [i.e., *MacGillivray* and *Milne*] and by Dr. *Harvey*. Society Islands, *Nightingale*." There are at Kew collections named var. γ [i.e., *milneana*] by Hooker from Maala, Fiji, *Milne* (Morton photograph 14910) and Fiji, *Harvey* (Morton photographs 14911, 14912), from woods above Makerie Harbour, San Cristoval Island, Solomon Islands, *Milne* 511 (Morton photograph 14909), and Society Islands, *Nightingale* (Morton photograph 14913). On page 227 Hooker indicated his variety γ as from the Feejee [Fiji] Islands, and this would eliminate the San Cristoval Island specimen from being the lectotype (although it was doubtless included in the concept by Hooker). Also on page 227 Hooker commented on the Nightingale specimen as being peculiar and somewhat different, and this also eliminates it as lectotype. One might think that the Milne specimen from Fiji would be the logical choice of lectotype, since the variety was named for Milne. Hooker's drawing of the variety (*t. 138B*), however, shows the lower pinnae forked, and this Milne specimen has no lower pinnae. The illustration must have been drawn from the Harvey specimen that does have forked lower pinnae, and this specimen is here designated lectotype.

In the above discussion I have termed the lower pinnae "forked" for convenience, but they are really not forked; the lowest inferior segment is elongate and again pinnatifid, in the manner of *P. biaurita* and *P. quadriaurita*. The venation is, however, not like these species but is of the fully areolate *Litobrochia* type.

126. Pteris villosa Baker, Ann. Bot. 5:218. 1891, non Swartz, 1802, nec Fée 1852. **=Pteris decurrens** K. B. Presl, Del. Prag. 2:183. 1822. Type: Brazil, *Pohl* (not seen).
Syntypes: Hort. Linden, 1859 and 1861. Lectotype: Hort. Linden, 1859 (K, Morton photograph 14919).

Pteris villosa Baker (in the "Index Filicum" erroneously as "Linden") has never been placed, being listed as dubious in the "Index Filicum." It was said to have been introduced from Assam, India, but no similar species is known from India. In its cutting and pubescence the type matches *Pteris decurrens* K. B. Presl, a rather common

Brazilian species distinguished among other things by having the costae sparsely (or sometimes densely) villosulous beneath.

127. SAGENIA HETEROCARPA Bedd. Ferns Brit. Ind. *t.* 47. 1866. =**Tectaria heterocarpa** (Bedd.) Morton, comb. nov.

Nephrodium heterosorum Baker *in* Hook. & Bak. Syn. Fil. ed. 2. 504. 1874. Based on *Sagenia heterocarpa* Bedd., non *Nephrodium heterocarpum* (Blume) Moore, 1858.

Aspidium heterocarpum (Bedd.) Bedd. Ferns Brit. Ind. Suppl. 16. 1876, non *A. heterocarpon* Blume, 1828.

Asidium heterosorum (Baker) Bedd. Handb. Ferns Brit. Ind. Suppl. 46. 1892.

Tectaria heterosora (Baker) Ching, Sinensia 2:29. 1931.

TYPE: Khasya Hills, India, *Thomson* (Holotype K).

In transferring this species to *Nephrodium*, Baker was quite right to rename it *N. heterosorum*, because the epithet *heterocarpum* was not available under *Nephrodium*. When Ching transferred the species to *Tectaria* in 1931, however, he ought to have used the earlier epithet *heterocarpa*, which was available under the generic name *Tectaria*, and which must now be restored.

128. SALVINIA LAEVIGATA Humb. & Bonpl. ex Willd. *in* L. Sp. Pl. ed. 4, 5:537. 1810. =**Limnobium laevigatum** (Humb. & Bonpl.) Morton, comb. nov.

Trianca bogotensis Karst. Linnaea 24:424. 1856.

TYPE: Santa Fé de Bogotá, Colombia, *Humboldt & Bonpland* (holotype not seen; isotype P–Humb. Herb., Morton photograph 3351).

It has been known, for instance in the "Index Filicum" and Reed's "Index Marsileata et Salviniata," that *Salvinia laevigata* Humb. & Bonpl. was not a *Salvinia* but an aquatic flowering plant of the family Hydrocharitaceae. The fact that this plant was wrongly ascribed to the ferns does not make the epithet *laevigata* illegitimate and unavailable; since it has priority, it must replace *bogotensis* as the correct name. It is possible that *L. laevigatum* is the same as *Hydromystria stolonifera* G. F. W. Meyer (Prim. Fl. Esseq. 152. 1818), which is *Limnobium stoloniferum* (G. F. W. Meyer) Griseb (Fl. Brit. W. Ind. 506. 1862), but the epithet *laevigatum* is older than *stoloniferum* also.

129. SYNAPHLEBIUM PULCHRUM Brack. U.S. Expl. Exped. 16:223. 1854. =**Lindsaea pulchra** (Brack.) Mett. Ann. Sci. Nat. IV, 15.65. 1861.

SYNTYPES: Tutuila, Samoa, and Sandalwood Bay, Fiji, Wilkes Expedition (US).

In the "Index Filicum," Christensen had an entry "Lindsaya pulchra var." of Mettenius in 1861 and gave the author of *L. pulchra* as a species as "Carr. in Seem. Fl. Vit. 337. 1873." It is obviously impossible nomenclaturally to have a variety published 12 years prior to a specific combination. In point of fact, the entry of Mettenius' is "27. *L*[*indsaea*]

pulchra var.? (Synaphlebium Brach. [sic!] expl. 223). 'Balade' (1553)." This is in Mettenius' paper on the ferns collected by Vieillard in New Caledonia, and the locality "Balade" and the number "1553" refer to Vieillard's collecting locality and collection number. The "var?" refers to Mettenius thinking that this Vieillard collection was a doubtful variety of *L. pulchra;* it does not mean that Mettenius considered *L. pulchra* itself as a possible variety of something else, for it is given a species number and accepted as a valid species the same as the preceding "26. L. lanceolata Billard." and "27. L. vieillardii n. sp." Therefore, Mettenius is the author of the specific combination and not Carruthers.

130. **Trichomanes collariatum** van den Bosch. Nederl. Kruid. Arch. 4:368. 1859.
Trichomanes martinezii Rovirosa, Pterid. Sur Mex. 106, *t. 7A, figs. 1–3.* 1909.
Type: Rocky banks of the Río Lacanja, Chiapas, Mexico, *Leandro Martinez* 1103 (not seen).

TYPE: Tabasco, Mexico, 300 ft., *Linden.* Van den Bosch cited no number or specific locality in Tabasco. I have seen a specimen from Teapa, Tabasco, *Linden* 1508 (K, Morton photograph 19047); it is very likely an isotype, for it agrees with the description, and also with the description of *T. martinezii* Rovirosa, which seems surely a synonym.

This species has been little known, most specimens probably having been identified as *T. radicans* Swartz, from which it differs in having a definitely two-lipped flaring involucre instead of a truncate one. The fronds are usually short-stipitate, whereas those of *T. radicans* usually are long-stipitate, but there is some variation. *Trichomanes collariatum* occurs from Tabasco and Chiapas in Mexico south to Colombia, and is not at all rare in Central America.

131. **Trichomanes crenatum** van den Bosch, Ned. Kruid. Arch. 5(3):205. 1863.
Trichomanes crispiforme Alston *in* Exell, Cat. Vasc. Pl. Sao Tomé 57. 1944, nom. superfl. Based on *T. crenatum* van den Bosch 1863, non Gilibert, Exerc. Phyt. 2:556. 1792.
LECTOTYPE: Niger, West Africa, *Barter* 1918 (K, Morton photograph 19067). The other syntype is Niger, West Africa, *Barter* 1917 (K).

Alston renamed *T. crenatum* van den Bosch believing that it was an illegitimate later homonym of *T. crenatum* Gilibert. McVaugh, however, has convincingly shown that names published in Gilibert's "Exercitia Phytologica" are not validly published by Art. 23 of the Code, because Gilibert did not consistently employ the Linnaean system of binary nomenclature. On the contrary, as McVaugh shows, Gilibert changed some Linnaean binomials into polynomials, such as renaming *Anthericum lithago* L. as "*Anthericum non ramosum*" and *Lythrum salicaria* L. as "*Lythrum salicis folio.*" Gilibert also described species with names like "*Agaricus totus luteus*," "*Samolus beccabungae facie*,"

"*Jasione scabiosae capitulo*," and so forth. This being so, the name *T. crenatum* van den Bosch is correct and the name *T. crispiforme* Alston is superfluous.

132. Trichomanes debile van den Bosch, Nederl. Kruid. Arch. 5(2):154. 1861.
=Trichomanes diaphanum H. B. K. Nov. Gen. Sp. 1:25. 1816.
Type: Carabobo, Venezuela, *Funck & Schlim* 596 (not seen).

In the "Index Filicum" this is recognized as a distinct species. I have not seen the type, but there is a sheet at Kew identified by van den Bosch; it contains two collections, one from Ecuador, *Jameson*, and one from Venezuela, *Fendler* 459. These plants are similar and both can be matched with rather small, less divided, exiguous forms of *T. diaphanum* H. B. K., as it is currently recognized.

133. Trichomanes idoneum Morton, nom. nov.
Trichomanes gemmatum J. Smith, Journ. Bot. Hook, 3:417. 1841, nom. nud.
Based on Mount Ophir, Malacca, *Cuming* 400.
Trichomanes bifidum Presl, Hymen. 43. 1843, non Vent. ex Willd., 1810.
Type: Mount Ophir, Malacca, *Cuming* 400 (holotype presumably PR).
Trichomanes gemmatum sensu Copel. Phil. Journ. Sci. 51:269. 1933, non Baker, 1867.

The name *T. gemmatum* J. Smith was never validated by anyone until, for some reason not readily understandable, Baker took it up (in Hooker & Baker, Syn. Fil. 87. 1867), citing as synonyms *T. cellulosum* Sturm, *T. filiforme* Sturm, *T. longisetum* Brack., *T. asae-grayi* v.d. Bosch, and *T. foeniculaceum* Hook. (p.p.). Of these, *T. longisetum* is merely a misidentification by Brackenridge (a "sensu" name) and *T. foeniculaceum* sensu Hooker was only "pro parte," but the other three species cited as synonyms were all validly published and legitimate, and there was no reason to displace them by accepting a nomen nudum in their place. Thus *T. gemmatum* Baker is a nomen abortivum, a superfluous name. Baker's description was based probably in part on *Cuming* 400, the plant assigned the name *gemmatum* by Smith, but it was based also on varied plants from Venezuela, Brazil, Polynesia, Java, and the Philippines, and so it cannot be said that all these synonyms were cited by Baker in error. Copeland ignored all this and adopted the name *gemmatum* for a local species native to Malaya and Borneo, saying merely "As Baker takes up the name of J. Smith, the type is the only specimen cited by Smith, *Cuming* 400, from Malacca." In fact, Baker did not cite Smith's publication of 1841, nor did he mention *Cuming* 400. Since *T. gemmatum* Baker is a superfluous name, it must be lectotypified on the basis of the earliest name that ought to have been adopted, *T. cellulosum*, which Baker cites as "Sturm, Hk. 2nd Cent. Ferns, *t. 63*." But a check of this reference shows that the

plant described and figured by Hooker is *T. cellulosum* Klotzsch, Linnaea 18:531. 1844, a species which had been adopted by Sturm in Martius' "Flora Brasiliensis." The type of *T. cellulosum* Klotzsch is *Schomburgk* 1186, from the Kanuku Mountains, British Guiana, and this must therefore be the lectotype of *T. gemmatum* Baker. Holttum in his "Ferns of Malaya" adopted Copeland's concept of "*T. gemmatum*," apparently without looking into the nomenclature carefully. One further important point to be mentioned is that Presl described *Cuming* 400 as a new species, *T. bifidum* Presl, a name which has been overlooked in the "Index Filicum," presumably because it was described only in a footnote; Presl's name is a later homonym of *T. bifidum* Ventenat ex Willd. (1810). Presl's description, though brief, is fully adequate to validate his name.

134. TRICHOMANES LONGIFOLIUM Desv. Mag. Naturf. Freund. Berlin 5:328. 1811. =**Trichomanes pinnatum** Hedw. Fil. Gen. Sp. *t. 4, f. 1.* 1799.
TYPE: "In America calidiore" (holotype P ex Herb. Desvaux, Morton photograph 22053).

In the "Index Filicum," *T. longifolium* Desv. is indicated as a synonym of *T. crispum* L., possibly on the basis of Desvaux's comparison of his species with *T. crispum*. An examination of the types, however, shows that the species is clearly a synonym of the common and widespread *T. pinnatum* Hedw.

135. TRICHOMANES STRIATUM D. Don, Prodr. Fl. Nepal. 11. 1825. =**?Trichomanes giganteum** Bory ex Willd. *in* L. Sp. Pl. ed. 4, 5:514. 1810. Type: Bourbon [Réunion], *Bory* (Herb. Willdenow 20216, B, not seen).
TYPE: Nepal, *Buchanan-Hamilton* (holotype BM, Morton photograph 6578).

In the "Index Filicum," *Trichomanes striatum* is considered dubious but is referred with a query to *T. bipunctatum* Poir., which is a wild guess, for the type as well as the original description shows a plant widely different from *T. bipunctatum*.

The type sheet has an annotation indicating that the plant on the right-hand side is the type of *T. striatum* (which it is) and that the plant at the left is probably the type of *Hymenophyllum ramosissimum* D. Don. This it clearly is not, for it does not bear the name in Don's hand, does not have the locality data, and quite disagrees with the original description; this plant is sterile, whereas Don described the sori and indusia of *H. ramosissimum*. This left-hand plant is in fact the sterile part of the holotype of *T. striatum*. Don indicated that he saw both sterile and fertile fronds, for he commented: "fructiferae sunt opaciores et tenuius sectae," which is true. The holotype shows that *T. striatum* belongs to the group of *T. radicans* Swartz. From the nonalate stipe and rhachis and the somewhat greater division of

the blade, I take it to be the plant called *T. giganteum* Bory by Copeland (Phil. Journ. Sci. 51:220. 1933) in his revision of Old World *Trichomanes*. This may well be correct, but neither Copeland nor I have seen the type of that species or any material from the type locality. The holotype agrees with a specimen (US) from Mongpo, Sikkim, 5,500 ft. alt., Oct. 7, 1884, *Clarke* 36382A, originally distributed as *T. radicans* Swartz, and identified by Copeland as "*T. giganteum* Bory?."

136. TRICHOMANES TENELLUM Hedw. Fil. Gen. Sp. ad *t.* [*6*], text & *f. 1, 1a, 1b.* 1799. =**Trichomanes capillaceum** L. Sp. Pl. 1099. 1753.

Trichomanes trichoideum Swartz, Journ. Bot. Schrad. 1800(2):98. 1802; Syn. Fil. 144. 1806. Illegitimate renaming of *T. tenellum* Hedwig.

Trichomanes trichodes Swartz, Fl. Ind. Occ. 3:174. 1806. Renaming of *T. trichoideum.*

Trichomanes trichoideum Swartz was a renaming of *T. tenellum* Hedw., seemingly due to a misunderstanding. In the unnumbered Hedwig plate the habit illustration of *T. tenellum* is so placed that it might seem to belong with the name *T. pusillum* rather than with *T. tenellum.* Since this does not by any means represent *T. pusillum* Swartz (1788), Swartz renamed this plant *T. trichoideum* in 1802, citing *T. pusillum* Hedw. as a synonym. In Hedwig's plate, however, *T. pusillum* is represented by figs. 5, 5g, and 5h, an entirely different plant of the sect. *Didymoglossum.* Swartz evidently realized his error later and corrected it in his "Synopsis Filicum" by citing *T. tenellum* Hedw. as a synonym of his own *T. trichoideum* and omitting the "*T. pusillum*" Hedwig. Since *T. tenellum* was validly published and had priority, however, Swartz ought to have adopted that name and reduced his own *T. trichoideum* to synonymy. The matter is not of importance, since both names are presumably synonyms of the older *T. capillaceum* L.

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WILLIAM ROXBURGH'S FERN TYPES

By C. V. MORTON

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WILLIAM ROXBURGH'S FERN TYPES

C. V. Morton

This paper originally was titled "William Roxburgh, His Life, Collections, and Fern Types," but at the time of his death, in 1972, Mr. Morton left as complete only that portion of the paper dealing with Roxburgh's fern types. Although he had gathered some materials and references on Roxburgh's life and collections, time did not permit him to write about them.

At those few points in the manuscript where Mr. Morton queried what he had written or where he intended to double-check information, I have done so and thus have removed any ambiguity. Fortunately, almost none of these cases proved doubtful. I would like to acknowledge the help of Drs. F. M. Jarrett and R. E. Holttum, who helped Mr. Morton by letter and during his visits to Kew and who also submitted comments on portions of the manuscript.—D. B. Lellinger.

1. Acrostichum alatum Roxburgh, Calcutta Journ. Nat. Hist. 4:480. 1844. =**Bolbitis appendiculata** (Willd.) K. Iwatsuki, Acta Phytotax. Geobot. 18:48. 1959.

Type: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photographs 5055 and 19999, right-hand plant). Native of the Malay Islands according to Roxburgh, which means either Penang Island or the Molucca Islands, where all of Roxburgh's specimens came from.

In the "Index Filicum," *A. alatum* Roxb. is referred to *Stenochlaena sorbifolia* var. 3, i.e., *Lomariopsis cochinchinensis* Fée, with which the type of *A. alatum* has nothing to do; also Roxburgh's description indicates that his species is not *L. cochinchinensis*. The sheet cited above is the only one found in any herbarium bearing the name *A. alatum* in the hand of Roxburgh, and the plant at the right agrees with Roxburgh's description of the fertile fronds. This has been identified in Baker's hand as *Lomaria alpina* Spreng., but it is not that. Roxburgh also describes the sterile fronds, but these have apparently been lost. The other plant on the type sheet is a sterile

plant marked "Acrosticum [sic] native place and species undetermined" not in Roxburgh's hand. This plant appears to have been added at a later date. It does not agree with Roxburgh's description of the sterile leaves of his *A. alatum* and is to be eliminated from consideration. Since this plant is poor, sterile, and without locality or collector, it is a bit hard to place, but it may be *Blechnum aggregatum* (Colenso) Tindale from New Zealand.

2. ACROSTICHUM EMARGINATUM Buchanan-Hamilton ex Roxburgh, Calcutta Journ. Nat. Hist. 4:480, *t. 27, f. 2.* 1844 =**Acrostichum aureum** L. Sp. Pl. 1069. 1753.

LECTOTYPE: A specimen in the Delessert Herbarium, Geneva, with the tag "India Orient. Dr. Roxburgh" and the name *Acrostichum emarginatum* R. in the hand of Roxburgh; the sheet has a tag "Typus" (Morton photograph 16774). The locality is "Delta of the Ganges," India, according to Roxburgh. Roxburgh (Hort. Beng. 75. 1814) stated that it was collected in 1796 and grown in the Calcutta Botanical Garden.

A Roxburgh drawing in Kew (no. 1743) represents the same plant (Morton photograph 15852), and a specimen is reported to be in Brussels.

This species was presumably considered distinct, as indicated by the epithet chosen, on the basis of the pinnae being emarginate at the apex, i.e., somewhat cut in at the apex and with the midrib extending out as a short mucro in contrast with the generally rounded apices of the pinnae. This is a common variant, however, occurring in both the Old and New World, and is perhaps teratological; at least it does not appear to have taxonomic importance.

3. ACROSTICHUM RADIATUM Koenig ex Roxburgh, Calcutta Journ. Nat. Hist. 4:479. 1844. =**Actiniopteris radiata** (Swartz) Link, Fil. Sp. 80. 1841.

LECTOTYPE, chosen by Pichi-Sermolli (Webbia 17:11. 1962): India, *Koenig* (S-PA). From a comparison with Koenig specimens in other herbaria that seem to be part of the type collection Pichi-Sermolli has determined that the material probably came from Tranquebar, Coromandel, India.

Roxburgh did not consider this a new species, but rather an unpublished combination based on *Asplenium radiatum* Swartz (1802). Swartz had cited *Acrostichum radiatum* Koenig as the basis for his new species, but he considered it an *Asplenium* rather than an *Acrostichum*. It was Roxburgh's intention to revert to Koenig's generic opinion. When Roxburgh was writing, probably prior to 1810, the name *A. radiatum* had not been published, but it was published subsequently as *Acrostichum radiatum* Koenig ex Poir. *in* Lam. Encycl. Méth. Suppl. 1:128.

1810. Roxburgh cited the same illustration as Swartz, viz. Vahl, Symb. Bot. 1:*t. 25*. 1790.

The typification of *Asplenium radiatum* Swartz offers some problems, since Swartz did not cite India as a locality, but rather Bourbon Island and Arabia. Since Vahl's illustration cited by Swartz did not represent the true *A. australe* L.f. as was intended, it must have been based on the other synonym cited by Vahl, namely *Acrostichum dichotomum* Forssk. There would thus be some reason to typify *Asplenium radiatum* on the basis of a Forsskål specimen from Arabia. According to Pichi-Sermolli, originally a specimen of this species was in the Forsskål Herbarium in Copenhagen, but it has now been lost and only an impression remains. Under the circumstances it seems that Pichi-Sermolli was right in assuming that Swartz accidentally omitted mention of the locality India, and therefore that a Koenig specimen is the proper lectotype. It is not quite to be expected that plants from India and Arabia would be conspecific, but in this case it appears that they are.

Only one specimen from Roxburgh has been seen, this in Oxford (Morton photograph 20200); it bears the date May 29, 1808. According to Roxburgh, it was collected in the mountains of Coromandel. There is a drawing by Roxburgh of this at Kew (no. 695, Morton photograph 15853); although stylized, the drawing is clearly identifiable as *A. radiata.*

4. ACROSTICHUM SEETACOONENSE Roxburgh, Calcutta Journ. Nat. Hist. 4:480. 1844. =**Bolbitis appendiculata** subsp. **vivipara** (Ham. ex Hook.) Hennipm. Blumea 18:146. 1970.

Polybotrya vivipara Hook. Exot. Fl. 2:*t. 107*. 1824.

Acrostichum viviparum Buch.–Ham. ex Spreng. Syst. Nat., ed. 16, 4:36. 1827, non L. f., 1781.

Polybotrya nodiflora Bory *in* Bélanger, Voy. Bot. 2:17. 1833.

Egenolfia nodiflora Fée, Gen. Fil. 48. 1852.

TYPE: A specimen in the Brussels Herbarium with the name in Roxburgh's hand (Morton photograph 20016); the plant was collected according to Roxburgh in Chittagong, near the Burning Wells at Seetacoond, then in East Bengal and now in East Pakistan. Since this is the only specimen of this species found in Kew, British Museum, Geneva, or Brussels, it may be considered to be unique and therefore the holotype.

In his treatment of *Egenolfia,* Ching (Bull. Fan Mem. Inst. Biol. 2:304. 1931) confused the nomenclature of this species by citing the epithet *vivipara* as dating from "*Acrostichum viviparum* Hooker, Exot. Flora 2:*t. 107*. 1827," thus telescoping the citations for *Polybotrya vivipara* Hook. and *Acrostichum viviparum* Buch.-Ham. ex Spreng. Since *Acrostichum viviparum* was a later homonym, Ching rejected the epithet *vivipara,*

but *Polybotrya vivipara* Hook. was quite valid. Dr. E. Hennipman is currently revising the genera *Egenolfia* and *Bolbitis* in the Asiatic and Malaysian regions and may have a different disposition for this species eventually.

5. ACROSTICHUM SEMIPINNATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:480. 1844. =**Tectaria semipinnata** (Roxburgh) Morton, comb. nov.
Gymnogramme maingayi Baker *in* Hook. & Bak. Syn. Fil. ed. 2, 517. 1874. Type: Malacca, Malaya, *Maingay* in 1809 (presumably K).
Aspidium maingayi (Baker) Holttum, Gard. Bull. Str. Settl. 5:207. 1931.
Tectaria maingayi (Baker) C. Chr. Ind. Fil. Suppl. 3:182. 1934.

LECTOTYPE: A specimen in the British Museum with the name in the hand of Roxburgh and the number 2367 [or 2337?] (Morton photograph 6800). A native of the Malay Islands, according to Roxburgh, which in this case probably means Penang Island, since plants matching the lectotype closely have been found on Penang but do not occur in the Moluccas, the other locality referred to by Roxburgh as the "Malay Islands." A specimen matching the lectotype is in the Brussels Herbarium without any name or indication of collector; I feel sure that it is an isotype.

In the "Index Filicum," *Acrostichum semipinnatum* Roxb. is referred to *Leptochilus latifolius* (Meyen) C. Chr. with a query, doubtless on the basis of the original description only. The authentic specimen chosen as lectotype shows that this was an error, for the plant is clearly the Malayan species called *Tectaria maingayi* in Holttum's "Ferns of Malaya." A specimen in the U.S. National Herbarium from Penang, *Curtis* 577, matches the lectotype closely. Roxburgh referred his plant to *Acrostichum* and Baker his plant to *Gymnogramma* because of the sori not being round, as in Roxburgh's and Baker's *"Polyodium,"* but extended along the veins irregularly and thus appearing acrostichoid or "gymnogrammoid." They are exindusiate, as might be expected. Strangely enough, Roxburgh described another species, this one called *Polypodium semipinnatum,* which represents the same species of *Tectaria.* He called attention to its resemblance to his *Acrostichum semipinnatum.*

Holttum (Gard. Bull. Str. Settl. 5:207–209. 1931) cites the extensive synonymy of this species, which includes *Polypodium heterosorum* Baker (1874), *Phegopteris subdecurrens* Luerss. (1882), and *Campylogramme trollii* Goebel (1931). He also gives an interesting discussion of the ecology and variation in this species.

6. ADIANTUM CAUDATUM sensu Roxb. Calcutta Journ. Nat. Hist. 4:512, *t. 34.* 1844. =**Adiantum indicum** Ghatak, Bull. Bot. Surv. India 5:71, 74. 1963, at least pro parte.

I have seen a herbarium specimen in Brussels ("Ind. or."

Roxburgh, Morton photograph 19885) identified by Roxburgh as *A. caudatum*; it agrees with Roxburgh's rather good description and with another specimen from Roxburgh, no. 364, June 8, 1808, at Oxford (Morton photograph 20198); these both represent the species recently segregated from *A. caudatum* L. sens. lat. as *A. indicum* Ghatak. The published Roxburgh drawing, op. cit., *t. 34*, and the drawing labeled *A. caudatum* preserved at Kew (Roxburgh drawing 1756, Morton photograph 15854) presumably also represent *A. indicum*, so far as one can judge from rather crude drawings. Roxburgh gave the range as "Hindoostan as well as Ceylon," and doubtless included the true *A. caudatum* L. from Ceylon in his concept. In the "Hortus Bengalensis," Roxburgh indicated that the plants cultivated in the Calcutta Botanical Garden had been collected by T. Colebrooke, Esq.

Nayar, in his account of *Adiantum* in India (Bull. Nat. Bot. Gard. Lucknow no. 52. 1961), described an "*A. caudatum* var. *assamicum*" (p. 7) and a "var. *flabellatum*" (p. 8), but these are not validly published, because they lack Latin diagnoses and also lack a citation of a type; in fact no specimens are cited of the new varieties. Judging from the description, it appears that "var. *assamicum*" is probably *A. indicum*. Although Ghatak does not mention "var. *assamicum*," he must have known of it. "Variety *flabellatum*" seems to represent *A. incisum* Forssk.

7. ADIANTUM MICROPHYLLUM Roxburgh, Calcutta Journ. Nat. Hist. 4:513. 1844, non Swartz, 1788. **=Adiantum venustum** D. Don, Prodr. Fl. Nepal. 17. 1825.

TYPE: In the published version of Roxburgh's *A. microphyllum*, *A. venustum* D. Don is cited as synonym. Roxburgh could not have added this synonym, since he was dead by the time Don's "Prodromus" was published, and so it must have been added by the editor Griffith; even so, the published work must be taken at face value, and so *A. microphyllum* was a superfluous change of name for *A. venustum;* this being so, it must have the same type, namely, Nepal, *Wallich*.

The only herbarium specimen found bearing the name *A. microphyllum* Roxb. is in the East India Company Herbarium at Kew (no. 81-4, Morton photograph 14709, the left-hand plant on the sheet); this specimen, authentic for Roxburgh's concept, agrees with *A. venustum* D. Don.

8. ADIANTUM PROLIFERUM Roxb. Calcutta Journ. Nat. Hist. 4:512. 1844. **=Adiantum incisum** Forssk. Fl. Aegypt.-Arab. 187. 1775.

Adiantum flagelliferum Wall. Num. List 61, no. 76–5. 1830, nom. nud. This is based on a Roxburgh specimen without locality (Morton photograph 14705) and is not the same as *A. flagelliferum* Wall. Num.

List. 4, no. 76. 1829, nom. nud., which is based on a plant collected by Wallich at Sylhet, Assam.

LECTOTYPE: "Ind. or.," Roxburgh Herb. 2423 (BR, Morton photograph 19888). According to the original description this species came from the Molucca Islands, where it was doubtless collected by Christopher Smith either in Amboina or Honimoa.

Adiantum incisum Forssk. has not usually been distinguished from *A. caudatum* L., but Pichi-Sermolli (Webbia 12:669–678. 1957) showed that it may be distinguished by characters of pubescence and cutting. The exact range of these species needs to be established. The three treatments of the group of *Adiantum caudatum,* all published within six years by Pichi-Sermolli (Webbia 12:669–678. 1957), Nayar (Bull. Nat. Bot. Gard. Lucknow No. 52. 1961), and Ghatak (Bull. Bot. Surv. India 5:71–77. 1963), came to different conclusions, and none of these papers referred to any of the others. I have not studied the original specimen of *A. flagelliferum* Wall., but it may, from the Assam locality, refer to *A. indicum* Ghatak, if that is distinct from the true *A. caudatum;* according to Ghatak, *A. caudatum* has the one-celled hairs of the lower leaf veins hamate [hooked or uncinate] at the apex, whereas these hairs in *A. indicum* have straight apices; this is very likely true but a bit hard to see in practice.

9. ADIANTUM TENERUM Roxburgh, Calcutta Journ. Nat. Hist. 4:513. 1844, non Swartz, 1788, non L. von Buch, Abhandl. Akad. Wiss. Berlin 1816–17:360. 1819. =**Adiantum capillus-veneris** L. Sp. Pl. 1096. 1753.

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19871). According to Roxburgh, the species was collected at the northern boundary of Oude by A. Gott. An isotype is in the East India Company Herbarium, no. 73–9 (Morton photograph 15729).

In the "Index Filicum," *A. tenerum* Roxburgh is cited as though it were the same as *A. tenerum* L. von Buch., but Roxburgh's species was published independently with no mention of von Buch. The von Buch species apparently was a misidentification of *A. capillus-veneris* L. Roxburgh certainly did not intend his species as that of Swartz.

10. ASPLENIUM BIPINNATUM Roxburgh, Calcutta Journ. Nat. Hist. 4: 499. 1844. =**Diplazium esculentum** (Retz.) Swartz, Journ. Bot. Schrad. 1801(2): 312. 1803–4.

LECTOTYPE: A Roxburgh collection in the Brussels Herbarium mounted on two sheets, both named *bipinnatum* in Roxburgh's hand (Morton photographs 19607, 19608). There are two isotypes in Geneva, labeled "Amboina, Dr. Roxburgh" (Morton photographs 20626, 20627). According to Roxburgh

it is a native of Amboina and introduced into the Botanic Garden in Calcutta in 1798, according to Voigt (Hort. Suburb. Calcutt. 735. 1845). Another specimen in Brussels from the Roxburgh Herbarium is named *Asplenium hemionitis* by Roxburgh, which is probably the name first assigned by Roxburgh, who later realized that there already was an *Asplenium hemionitis* L., which is such an entirely different plant with a simple rather than bipinnate blade that Roxburgh could never have confused it with his own collection. A Roxburgh drawing at Kew (no. 2000) also represents this species (Morton photograph 15855).

Asplenium bipinnatum Roxburgh was referred wrongly to *Asplenium blumei* Bergsm. by Mettenius, presumably going only on the description, and correctly to *Callipteris ambigua* (Swartz) Moore [=*Diplazium esculentum*] by Moore.

11. ASPLENIUM CICUTARIUM Roxburgh, Calcutta Journ. Nat. Hist. 4: 500. 1844, non Swartz, 1788. =? **Asplenium tenuifolium** D. Don, Prodr. Fl. Nepalensis 8. 1825, fide Mett. Abhandl. Senckenb. Naturf. Gesell. 3:172. 1859.

TYPE: No herbarium specimen named *A. cicutarium* by Roxburgh has been found. Roxburgh's plant came from "mountains north of Rohilcund," i.e., the present Rohilkhand, Division of Agra, Northern United Provinces, India.

Roxburgh evidently did not consider this species as new, for he lists it as "*Asplenium cicutarium* Linn.," but there is no such Linnaean species. There is an *Asplenium cicutarium* Swartz, but there is really no reason to associate Roxburgh's species with that American species. Roxburgh does not mention Swartz in this fern work and probably did not know Swartz' work. Nor does Roxburgh's description match the description of *A. cicutarium* Swartz. Under the circumstances, it is best to consider *A. cicutarium* Roxburgh as a new species, as did Mettenius in the paper cited above, Moore in his "Index Filicum," and Christensen in his "Index Filicum."

The original description is as follows: "Shoots creeping, scaly. Stipes alternate, polished; fronds alternately subtripinnate, as broad as long (6–8 inches high); ultimate divisions subovate, with the anterior margins crenately-dentate, firm, and smooth on both sides."

As may be seen, this is one of Roxburgh's poorer descriptions, and his plant is not definitely identifiable from it. Mettenius' guess seems a possibility, for the segments in this are firm and smooth, they are toothed, although whether one could call them "crenate-dentate" is dubious; the fronds are subtripinnate, or usually fully tripinnate, and sometimes nearly as broad as long; the size too is within the size range of *A. tenuifolium*, which is

a common species in the area concerned. Moore guessed that Roxburgh's plant was *Asplenium praemorsum* Swartz, but this does not seem possible unless one assumes that Roxburgh intended "Pinnae as broad as long," rather than fronds as broad as long as stated in the description. Moore's identification was retained in Christensen's "Index Filicum." Roxburgh's description is so vague that it could possibly apply to a wholly different plant, some species of *Diplazium* or *Athyrium*, such as the *Athyrium spectabile* (Wallich) K. B. Presl of the "Index Filicum," which should perhaps be considered as a *Diplazium* rather than an *Athyrium*. It will be necessary to find a specimen from the Roxburgh Herbarium that agrees with the description in order to place this species definitely.

12. ASPLENIUM CORIACEUM Roxburgh, Calcutta Journ. Nat. Hist. 4:497. 1844, non Desv. 1827. =**Asplenium macrophyllum** Swartz, Journ. Bot. Schrad. 1800(2):52. 1802. Type: Mauritius, *Groendal* (presumably S-PA).

LECTOTYPE: A specimen in the Brussels Herbarium named *A. coriaceum* in Roxburgh's hand, with the number 2407 (Morton photograph 19989). An isotype is in Geneva, marked "India Orient. Malay Islands, *Dr. Roxburgh*" (Morton photographs 6539 and 16807). Another presumable duplicate is in the East India Company Herbarium, no. 191-3 (Morton photograph 15726, left hand; the right-hand plant is Dindang, *Buchanan-Hamilton* in 1822); the last-named specimen differs from the others in having six rather than three pairs of pinnae, but it is probably a part of the same collection, since this species varies considerably in the number of pinnae, six being about the maximum number and three the minimum. By "Malay Islands" Roxburgh usually intended Penang Island, which may be presumed to be the type locality for *A. coriaceum*, since the type specimens agree with material collected in Penang.

When Roxburgh named his plant *A. coriaceum* the name was available, but before its publication in 1844 it was a homonym twice over, the same epithet having been used by Desvaux in 1827 and by Bory in 1833 for different plants. It seems to have been a popular name, for both Fée and Baker used the same epithet again in 1852 and 1867, respectively, for still different species. In the original publication is cited "*Asplenium finlaysonianum* Wall. 63, No. 191 (quod nomen delendum)," but this was added not by Roxburgh but by the editor, Griffith, who intended (as shown by the cited page 63) the citation of Wallich List 191-3 (the specimen of *A. coriaceum* Roxburgh as indicated by Wallich) and not Wallich no. 191 on page 8, which is based on a different collection. Actually Wallich was wrong in placing Roxburgh's *A. coriaceum* under his own *A. finlaysonianum*, for the plants represent different species. In *A. finlaysonianum* the

veins are partly anastomosing, whereas in *A. coriaceum* Roxburgh they are all free.

13. ASPLENIUM CRENATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:498. 1844, non Desv. 1827. =**Diplazium repandum** Blume, Enum. Pl. Jav. 2:191. 1828. Type: Java, *Blume* (holotype L, with the name in the hand of Blume, Morton photograph 979).

Diplazium crenatum (Roxburgh) Moore, Ind. Fil. 121, 329. 1859, non Poir. 1811.

LECTOTYPE: A specimen in Geneva labeled "India Orient. Malay Islands, Dr. Roxburgh," and "Typus" (Morton photographs 6538, 16914). There is a duplicate in Brussels from the Roxburgh Herbarium, no. 2412 (no. 2413 in the original description) (Morton photograph 19631) but with the wrong name tag "*Asplenium serrulatum*"; as noted under *A. serrulatum*, the name tags have become switched between Roxburgh's *A. crenatum* and his *A. serrulatum*. For this reason, I choose the Geneva specimen as lectotype, the specimen and the name that correspond with the described species. A Roxburgh drawing in the British Museum (Morton photograph 15761), labeled "Amboyna," fixes the type locality, which is stated by Roxburgh as merely "Malay Islands." It is likely that the specimen was collected by Christopher Smith, who provided Roxburgh with all his collections from Amboina.

The group of *Diplazium proliferum* (Lam.) DuPetit Thouars, recognized as the genus *Callipteris* Bory by Copeland, is in need of monographic study. It appears that the true *D. proliferum* from the Mascarene Islands is different from the Malaysian plants in its deeper and slightly different type of cutting of the pinnae. The Malaysian plants are usually all called *D. accedens* Blume, of which *D. repandum* Blume is considered a synonym. It may be so. Blume distinguished his *D. accedens* and *D. repandum* in the same way that Roxburgh characterized his *A. serrulatum* and *A. crenatum*, by the pinnae being remotely serrulate in the one and rounded-crenate in the other. I keep them separate tentatively, for in typical specimens they can be distinguished. However, there are many somewhat intermediate specimens that need further study.

In Mettenius' monograph of *Asplenium*, both *A. crenatum* Roxburgh and *A. serrulatum* Roxburgh are referred to *A. porrectum* Wallich, which is clearly wrong.

14. ASPLENIUM CULTRIFOLIUM sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:498. 1844, non L., 1753. =**Asplenium polyodon** Forst. Fl. Ins. Austr. Prodr. 80. 1786.

AUTHENTIC SPECIMEN: A specimen in the Brussels Herbarium with the name "*Asplenium cultratum?*" in the hand of Roxburgh and the number 2408 (Morton photograph 19982). There is a matching specimen in the British Museum collected in Amboina by Christopher Smith from the Rox-

burgh Herbarium, and this is surely authentic. A Roxburgh drawing of a plant from Amboina, unnamed, is also in the British Museum (Morton photograph 15755), and this agrees well enough with the herbarium specimens mentioned.

Asplenium cultrifolium L. (Sp. Pl. 1081. 1753) has remained an unknown species. Linnaeus cited his "Hortus Cliffortianus" (p. 474, *Asplenium* no. 5) and a Plumier reference to a plant from Martinique. There is no specimen in the Linnean Herbarium in London, but if there is one in Clifford's Herbarium (BM), it ought to be the lectotype rather than a plant known to Linnaeus only from a literature reference. It would be possible to identify the herbarium specimen definitely with material collected in the wild, but the Plumier plate cited is so stylized and poorly drawn that it is scarcely identifiable except by guesswork. For this reason the name *Asplenium cultrifolium* L. has remained out of use in recent years. In the "Index Filicum," it is considered a *Diplazium*. Concerning the synonymy of *A. polyodon* Forst. see my paper on fern types (Contr. U. S. Nat. Herb. 38: 40, 41. 1967).

The query in "*Asplenium cultratum?*" means—as it does in the similar case of "*Polypodium ciliatum* Roxburgh?"—not that Roxburgh was doubtful about the identity of his *Asplenium cultratum*, but that he was doubtful about describing it as a new species under this name. In this case he abandoned the name *Asplenium cultratum* and instead referred the specimen in his final manuscript to *Asplenium cultrifolium* L.

15. ASPLENIUM HEMIONITOIDES Roxburgh, Calcutta Journ. Nat. Hist. 4: 498. 1844. =**Diplazium tomentosum** Blume, Enum. Pl. Jav. 2:192. 1828. Type: Java, *Blume* (holotype L, a sheet with the name in Blume's hand and a hand-written description by Blume, Morton photograph 1012).

Diplazium burchardii Rosenst. Repert. Sp. Nov. Fedde 4:293. 1907. Type: Lalah Indragiri, between Tjinaco and Pakan Herun, Sumatra, 1906, *Burchard* (isotype L, Rosenstock Fil. Sumatr. Exs. no. 22, Morton photograph 1010). A reduction to *D. tomentosum* Blume was made by Rosenstock on the annotation label on this sheet in Leiden.

LECTOTYPE: A sheet in the Brussels Herbarium with the name in the hand of Roxburgh and the number 2409 (Morton photograph 19635). The locality was cited by Roxburgh as "Malay Islands." A duplicate specimen in Geneva (Morton photograph 16919) fixes the type locality as Amboina, where it may be presumed to have been collected by Christopher Smith.

Asplenium hemionitoides was reduced properly to the synonymy of *D. tomentosum* Blume by Moore in his "Index Filicum," without comment.

The lectotype is an unusually small specimen, less deeply cut, but it can be matched by other small specimens of *D. tomentosum,* which is rather distinctive by its hairy rhachis and the strongly deflexed lowest pinnae. The species appears to be very rare everywhere it occurs. Perhaps no one since Smith has found it again on Amboina. Roxburgh's name should perhaps have been spelled more properly *"hemionitidoides."* Roxburgh's choice of this name is explained by his comment: "In the double lines and involucres, it approaches to Smith's character of *Hemionitis,"* which shows clearly that Roxburgh did not know the character of *Diplazium,* which is to have the involucres double, i.e., back to back. *Hemionitis* has, of course, no "involucres."

16. **ASPLENIUM LINGUIFORME** Roxburgh, Calcutta Journ. Nat. Hist. 4:497. 1844. =? **Syngramma alismifolia** J. Smith, London Journ. Bot. 4:166. 1845. Lectotype: Singapore, *Lobb 11* (K, Morton photograph 20639).
TYPE: No Roxburgh material has been found, but it may be in Brussels filed as a *Syngramma.*

The original description is as follows: "Stipes long, and polished; fronds tongue-shaped, entire, smooth. Fructification in numerous, approximated lines, over the whole disk, and extending almost to the margin. (Involucre not visible in the dry specimen). *Nat. of the Moluccas."* As may be seen, this description is not quite adequate for a definitive determination. The long, shining stipe would exclude any simple-bladed species of *Asplenium* known in the Moluccas. In the "Index Filicum," *A. linguiforme* is referred with a query to *Polypodium feei* (Bory) Mett., probably on the basis of the description only, but in my opinion the description does not suggest this species very much. It does suggest greatly *Syngramma alismifolia* in the elongate, shining stipes, tongue-shaped blades, and exindusiate sori extending in close lines almost to the margin of the fronds. This species is not known from the Moluccas, but is expected there since it occurs as far east as the Solomon Islands.

The name *Syngramma alismifolia* is usually cited with the author (K. B. Presl) J. Smith, London Journ. Bot. 4:166. 1845, but this is incorrect. *Syngramma alismifolia* J. Smith was intended as a new species and *Diplazium alismifolium* K. B. Presl was excluded as a synonym, Smith believing Presl's species to be indusiate and different generically. It seems from Holttum's recent examination of Presl's type in Prague that *Diplazium alismifolium* is really exindusiate and is the same as *Syngramma alismifolia* J. Smith. Since Presl's *Diplazium*

alismifolium cannot now be transferred to *Syngramma* because that would create a later homonym, Smith's name *Syngramma alismifolia* J. Smith is the oldest and correct name for the species, unless *Asplenium linguiforme* Roxburgh proves to be the same, in which case Roxburgh's name will have a year's priority.

Incidentally, it may be mentioned that *Selliguea feei* Bory, the basionym of *Polypodium feei* (Bory) Mett., has a wrong citation in the "Index Filicum," which gives it as "Bory, Dict. Class. 6:587. 1824; 17:18, *t. 41*," which would seem to date it from 1824. The genus does date from 1824, but at that time the species name *Selliguea feei* was not proposed, nor was it in the subsequent discussion in Dict. Class. 15:344. 1829. The name appears only in the volumes devoted to the plates, and so it should be cited *Selliguea feei* Bory, Dict. Class. 17:18, *t. 41*. 1831; it is published here by a plate with analyses as well as by the reference to the previous descriptions of 1824 and 1829. Bory, in the 1829 paper, complains that Hooker had published the same species as a *Ceterach* (referring to *Ceterach pedunculata* Hook. & Grev. Icon. Fil. 1: *t. 5*. 1827) without mentioning his publication of 1824, but it turns out that Hooker and Greville's species is different from *Selliguea feei*.

17. ASPLENIUM MIXTUM Roxburgh, Calcutta Journ. Nat. Hist. 4:499. 1844.
=**Diplazium mixtum** (Roxburgh) Morton, comb. nov.

Asplenium prescottianum Wallich, Num. List. no. 235. 1829, nom. nud. Based on Singapore, 1822, *Prescott* (presumably in E. Ind. Co. Herb., K).

Asplenium acuminatum Wallich, Num. List. no. 205. 1829, nom. nud. Based on Penang, *Porter* (Presumably in E. Ind. Co. Herb., K). A duplicate is in the E. Ind. Co. Herb. under no. 205B (Morton photograph 19583a, right-hand plant).

Diplazium prescottianum (Wallich) Moore, Ind. Fil. 156, 234. 1859, nom. nud.

Asplenium acuminatum Wallich ex Mett. Abhandl. Senckenb. Naturf. Gesell. 3:225. 1859, non Hook. & Arn., 1832. Type: Penang, *Porter* (Wallich no. 205) (isotype BR, Morton photograph 19625).

Asplenium prescottianum Wallich ex Hook. Sp. Fil. 3:251. 1860. Based on Wallich List no. 235, i.e., Singapore, *Prescott* in 1822. Hooker also proposed a var. β from Singapore, *Lobb* and a var. γ from Penang, *Norris*, but since these are considered varieties they cannot be considered as syntypes of the species, and therefore the holotype is *Wallich* no. 235, presumably in the Hooker Herbarium, K.

Diplazium silvaticum var. *prescottianum* (Wallich ex Hook.) Curtis, Journ. Str. Br. Roy. Asiat. Soc. 25:159. 1894. The species name is wrongly spelled "*sylvaticum*" and wrongly referred to Presl rather than (Bory) Swartz.

Diplazium prescottianum (Wallich ex Hook.) C. Chr. Ind. Fil. 237. 1905, wrongly attributed to Moore. Moore did propose *D. prescottianum* (Wallich) Moore, but since the basionym *Asplenium prescottianum* Wallich was at the time a nomen nudum, Moore's name is equally a nomen nudum and invalid; nevertheless, it has been accepted, e.g., by Holttum in his paper on *Diplazium* in Malaya (Gard. Bull. Str. Settl. 11:94. 1940).

Athyrium prescottianum (Wallich ex Hook.) Holttum, Ferns of Malaya 557. 1954.

LECTOTYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19629). A second sheet in Brussels with the name *mixtum?* in a different hand agrees with the lectotype and is surely an isotype. Another isotype is in the East India Company Herbarium under the number 205B (Morton photograph 19583a, left-hand plant); it agrees with the specimens in Brussels. According to Roxburgh, this species was collected in Amboina, presumably by Christopher Smith.

In the "Index Filicum," *A. mixtum* was referred to *Diplazium silvaticum* (Bory) Swartz, following Moore's lead. Christensen here recognized *D. silvaticum* in a very broad sense as including plants from Asia, Polynesia, Australia, and Mauritius, and possibly tropical America. It is likely that the true *D. silvaticum* is confined to the Mascarene Islands; it differs from those confused with it in cutting and, I believe, in toothed scales. Roxburgh's type material seems to agree quite well with collections from Penang Island that were described as *Asplenium acuminatum* Wallich ex Mett. (an invalid later homonym that was overlooked in the "Index Filicum") and which are apparently currently referred by Holttum to *Diplazium prescottianum*. They represent the form of this without auricles on the pinnae, described from Penang Island as *Asplenium prescottianum* var. γ by Hooker. Whether these plants are different from the true *D. prescottianum* from Singapore remains to be determined, which would be done best by field study in Malaya. This might not be easy, however, since the species appears to be excessively rare. So far as I am aware, *D. prescottianum* has not been reported from Amboina or anywhere outside Malaya and Singapore, and consequently it is possible that *D. mixtum* is different; Roxburgh's plant is different in being smaller and slightly less cut. On the other hand, it is possible that Roxburgh was in error in stating that his plant came from Amboina, and that it really came from Penang, where many of his collections came from. This may be presumed if a search in herbaria and in the field for plants from Amboina of this type should be unsuccessful. In any case, however, the epithet *mixtum* would be older

than others of the group (except *silvaticum*), and so the combination *D. mixtum* would be a correct name.

18. ASPLENIUM MONANTHEMOIDES Roxburgh, Calcutta Journ. Nat. Hist. 4: 497. 1844. =? **Asplenium normale** D. Don, Prodr. Fl. Nepal. 7. 1825.

TYPE: No specimen of the species from the Roxburgh collections has been found, but one is said to be in Brussels.

The original description is as follows: "Stipes polished, round, with a groove; fronds (6–12 inches high) alternately-pinnate; leaflets delicate, smooth, trapeziform, very obtuse, anterior and exterior margins dentate-serrate; posterior entire. Fructifications in short lines, on both sides of the nerve; where the involucre expands they become round (as in *Polypodium*). *Nat. of Chittagong.*" In the "Index Filicum," *A. monanthemoides* is identified without doubt as *A. normale,* and this appears to be right. The description agrees well enough except for the statement that the sori are round when the indusia are expanded; the sori in *A. normale* are too long for that.

19. ASPLENIUM MULTIFLORUM Roxburgh, Calcutta Journ. Nat. Hist. 4:499. 1844. =**Diplazium multiflorum** (Roxburgh) Moore, Ind. Fil. 147, 333. 1859.

TYPE: A specimen in the Brussels Herbarium labeled no. 7, *A. multiflorum,* in the hand of Roxburgh (Morton photograph 19622). Since no other specimen has been located in any herbarium named by Roxburgh and which agrees with the original description, this may be presumed to be a holotype. According to Roxburgh, it was collected in the "Malay Islands." Since the type agrees with other material from Malaya, it may be presumed to have been collected on Penang Island where most of Roxburgh's collections cited as Malay Islands came from. Very likely they were collected by William Roxburgh, Jr., and given to his father.

Diplazium multiflorum (Roxburgh) Moore is listed in the "Index Filicum" as a dubious species, and it has never been placed before. It is close to *D. malaccense* K. B. Presl as represented by the type material. Some recently collected material by Mrs. B. E. G. Molesworth-Allen and identified as *D. malaccense* appears as though it may represent something a little different, or this species may be quite variable.

There are in Copenhagen two specimens from the F. von Mueller Herbarium identified as *Asplenium multiflorum* Roxburgh, but not in Roxburgh's hand, that do not agree with the original description, since the frond is completely bipinnate and disagrees in other respects. Some years ago I identified these specimens as *D. dilatatum* Blume, which may or may not be right.

20. ASPLENIUM NIDUS sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:496. 1844. =**Asplenium nidus** L. Sp. Pl. 1079. 1753.

AUTHENTIC MATERIAL: A Roxburgh specimen in the Brussels Herbarium (Morton photograph 19990), which very likely came from Amboina, collected by C. Smith in 1798 (cf. Hort. Bengal. 75. 1814). The species from Amboina are mostly represented by herbarium specimens in Roxburgh's herbarium now in Brussels, but many of the species from Chittagong and other parts of India are not.

Roxburgh evidently understood this species correctly from his description and from the specimen noted above. He recorded the species from "Chittagong, Malay Islands, etc."

21. ASPLENIUM RETICULATUM Roxburg, Calcutta Journ. Nat. Hist. 4:497. 1844. =**Loxogramme avenia** (Blume) K. B. Presl, Tent. Pterid. 215. 1836.

Grammitis avenia Blume, Enum. Pl. Jav. 2:117. 1828. Type: Java, *Blume* (holotype L, a sheet bearing a single frond, with the name in the hand of Blume, Morton photograph 1834).

Grammitis coriacea sensu Blume, Enum. Pl. Jav. 2:117. 1828, non Kaulf.

Loxogramme blumeana K. B. Presl, Tent. Pterid. 215. 1836. Based on the description of *Grammitis coriacea* sensu Blume, non Kaulf. Type: Java, *Blume* (holotype L, a sheet with a single frond determined as *Grammitis coriacea* in the hand of Blume (Morton photograph 1833).

LECTOTYPE: *Roxburgh*, East India Company Herbarium 10-2 (K, Morton photograph 14638, two right-hand plants; the left-hand plant is *Grammitis macrophylla* Wall. Num. List 10. 1829, nom. nud.). According to Roxburgh, his species occurs in the Malay Islands, which in this case probably means Penang Island.

The citation inserted after the name *Asplenium reticulatum*, namely "*Grammitis macrophylla* Wall. Cat. 61, No. 10," was inserted by the editor, Griffith, and does not mean that *A. reticulatum* was based on *G. macrophylla* Wall. but merely that Roxburgh's species is represented in the Wallich Herbarium under no. 10, actually 10-2. There is reported to be a specimen of *A. reticulatum* Roxburgh in Brussels, which, if found, should be the lectotype.

In the "Index Filicum," *A. reticulatum* Roxburgh is referred to *Polypodium scolopendrinum* (Bory) C. Chr., i.e., *Loxogramme scolopendrina* (Bory) K. B. Presl. From the characters given by Holttum in his "Ferns of Malaya," Roxburgh's species appears to be *L. avenia*, rather than *L. scolopendrina*, because it has the midrib raised above rather than beneath.

22. ASPLENIUM SERRULATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:498. 1844, non Cav., 1801. =**Diplazium accedens** Blume, Enum. Pl. Jav. 2: 192. 1828. Type: Java, *Blume* (presumably L, but not found by me in 1954).

Diplazium serrulatum (Roxb.) Moore, Ind. Fil. 167, 337. 1860, non Desv., 1827.

LECTOTYPE: A specimen in the Geneva Herbarium from "India Orient. Amboyna, *Dr. Roxburgh*" and marked "Typus" (Morton photographs 6537, 16918). An isotype is in the Brussels Herbarium with the wrong tag reading *Asplenium crenatum* and the number 2413 (Morton photograph 19602). Roxburgh cited the locality as "Amboyna and other Malay Islands."

Roxburgh described his *Asplenium serrulatum* as having the margins "remotely serrulate" and his *A. crenatum* with the margins "elegantly crenate." The specimens in the Brussels Herbarium have the name labels reversed, for the one with the serrulate pinnae in labeled *A. crenatum* and the one with crenate pinnae is labeled *A. serrulatum*. It seems clear that the name tags have been accidently reversed, either by Roxburgh or some later botanist. This is clearly shown by the specimens in Geneva where the proper plants and names do correspond. For this reason I am designating the specimens in Geneva as lectotypes, rather than those in Brussels, as I do in most cases where the Brussels specimen has a name in Roxburgh's hand.

It is likely that *A. serrulatum* Roxburgh is typical *D. accedens* Blume, for Blume described his species as having serrate pinnae.

23. ASPLENIUM TRAPEZIFORME Roxburgh, Calcutta Journ. Nat. Hist. 497. 1844. = **Asplenium unilaterale** Lam. Encycl. Méth. 2:305. 1786. Type: Ile de France [i.e., Mauritius], *Commerson* (holotype P. Herb. Lam., Morton photograph 2771).

Asplenium trapeziforme Roxburgh ex Wallich, Num. List. no. 2213, nom. nud. This entry referred to a plant in "Herb. Roxb." and is the specimen now in Brussels.

LECTOTYPE: A specimen in the Brussels Herbarium determined as *A. trapeziforme* in the hand of Roxburgh, with the number 2408 and the locality "Malay Islands." The specimen had been named first "*Asplenium monanthemum*," and the epithet "*monanthemum*" crossed out (Morton photograph 19994). This lectotype is probably from Penang Island, a locality sometimes intended by Roxburgh when he wrote "Malay Islands"; the specimen agrees with plants collected in Penang.

This species never has been identified properly. In Moore's "Index Filicum," *A. trapeziforme* Roxburgh is recognized as a distinct species, with the range "Malay Islands; India (Bombay, Mahabeleshuar); Bourbon." In Christensen's "Index Filicum," the species is wrongly credited to Wallich (who merely published Roxburgh's name as it was indicated on the specimen he received, his number 2313) and referred to "*A. lunulatum* var.?," evidently going solely on Roxburgh's description. The African *A. lunulatum* Swartz is indeed not very close. In "Supplement III," Christensen referred *A. trapeziforme* to *A. inaequilaterale*

Willd., citing the description and illustration in Beddome's "Ferns of Southern India," p. 45, *t. 134.* Beddome identified the plant that he illustrated as *A. trapeziforme* Roxburgh only with a query; the plant described and drawn does apparently represent *A. inaequilaterale* Willd. but is quite different from the true *A. trapeziforme* Roxburgh. Alston saw and photographed in Brussels the type of Roxburgh's species and made a note accompanying his photograph that *A. trapeziforme* is "a good species near *A. camptorhachis* Kunze." I cannot agree with that; I have seen authentic material of *A. camptorhachis* from southern India, and it is quite different. It is possible that *A. trapeziforme* is indeed different from typical *A. unilaterale* Lam., which seems to have a more slender rhizome with scattered fronds, but Roxburgh's species is not different from material from Asia that is commonly referred to *A. unilaterale* (as in Holttum's "Ferns of Malaya"), as for instance the specimen Penang, *Curtis* 567 (US), in which the rhizome is thicker, the roots more numerous and thicker, and the fronds more numerous and congested (without being at all fasciculate). If this plant is really a different species, it is unlikely that Roxburgh's name is the oldest, for there are several reputed synonyms of *A. unilaterale* that are older, including several originally from Java, described by Blume. Sledge mentions *A. trapeziforme* in his discussion of *A. inaequilaterale* Willd. and excludes it from that species, remarking that "it also has an erect rhizome but photographs in the British Museum Herbarium of the type specimen, including enlargements of the pinnae, clearly show the veins running to the extremities of the marginal teeth. The fronds are also pinnate to the end, not terminating in a distal, lobed, pinnae-like extremity." These remarks apply to *A. unilaterale* Lam. sens. lat., except for the statement that the rhizome is erect, which is a wrong observation, due to having studied only a photograph.

24. ASPLENIUM TRIPINNATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:500. 1844.

TYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh and the number 314 (Morton photograph 19988). Since no other specimen of this species has been found from the Roxburgh Herbarium, this may be presumed to be a holotype. Roxburgh indicated that his species was from the Moluccas, which means that he received it from Christopher Smith. There is a specimen in the British Museum collected in Amboina by Christopher Smith (Morton photograph 19511) that may well be authentic material; it is a more divided plant than the type but may be within the range of variation. If this is authentic, it would fix the type locality as Amboina.

In Moore's "Index Filicum," *Asplenium tripinnatum* is referred to *A. laserpitiifolium* Lam., and it does represent that species as it has usually been conceived in a very broad sense. Tardieu-Blot and Ching ("Revision des Espèces confondue avec l'Asplenium laserpitiifolium Lam. avec Description d'Espèces Nouvelles Asiatiques de ce Groupe," Notul. Syst. 5:134–154. 1936), however, showed that the true *A. laserpitiifolium* Lam. is apparently confined to the Seychelles Islands. Their illustration of the type shows that the species is not the same as *A. tripinnatum*. Tardieu-Blot and Ching described several species of this group from Indo-China—*A. confusum, A. sublaserpitiifolium, A. pseudolaserpitiifolium,* and *A. neolaserpitiifolium*—but none of these appears identical with *A. tripinnatum*. The common species of this alliance in Java, and perhaps also in Sumatra, New Guinea, and the Admiralty Islands, is *A. robustum* Blume (Enum. Pl. Jav. 2:189. 1828. Type: Salak, Java, *Blume,* holotype L, with the name in the hand of Blume, Morton photograph 543). This is a rather leafy plant, with the segments mostly obovate. *Asplenium tripinnatum* is more skeleton-like, with more distinct segments, these appearing oblanceolate or almost linear, due partly to the margins being somewhat inrolled. I am not sure that it is truly different from *A. robustum,* but it can stand as a distinct species tentatively.

25. ASPLENIUM VARIUM Roxburgh, Calcutta Journ. Nat. Hist. 4:498. 1844.
=**Diplazium crenatoserratum** (Blume) Moore, Ind. Fil. 325. 1859.
Diplazium roxburghii Moore, Ind. Fil. 176, 337. 1859.
Asplenium crenatoserratum Blume, Enum. Pl. Jav. 177. 1828. Type: Bantam Mountains, Java, *Blume*. Not located in Leiden in 1954. There is a specimen labeled *A. crenatoserratum* in Blume's hand (Morton photograph 960) which may be an isotype, but it lacks the locality "Bantam" and is sterile, whereas Blume clearly describes the sori; moreover, it does not agree very well with the description. Strangely enough, there is another specimen named *A. crenatoserratum* which was probably collected by Blume, but it is *Coniogramme fraxinea* (Morton photograph 771). It does not seem possible that Blume could have confused this widely different plant with an *Asplenium* (or *Diplazium*); it seems more likely that the labels have become mixed. A search should be made in Leiden under *Coniogramme* for a specimen of *Diplazium* agreeing with the description of *A. crenatoserratum* but with a label reading *Gymnogramma javanica* Blume or *Gymnogramma serrulata* Blume, the names under which *Coniogramme fraxinea* was originally described from Javan material.
Diplazium phanerotis Kunze, Bot. Zeit. 4:443. 1846. Type: Java, *Zollinger* 1491 (holotype G, Morton photograph 3830).
Diplazium roxburghii Moore, Ind. Fil. 176, 337. 1859. Based on *Asplenium varium* Roxburgh, non *Diplazium varium* Gaud., 1827. *Diplazium varium* Gaud. is also from the Moluccas and is still a dubious species. In

Christensen's "Index Filicum," *D. roxburghii* Moore is left in limbo, so to speak, neither accepted nor placed in italics as a dubious species.

Asplenium porrectum Mett. Abhandl. Senckenb. Naturf. Gesell. 3:220. 1859. Based on *Asplenium porrectum* Wallich Cat. 204, *Asplenium porrectum* Wallich Cat. 224, *Asplenium multisorum* Wallich Cat., p. 63, *Asplenium polyodon* Wallich Cat., p. 63, *Asplenium cataractarum* Moritzi, and *Diplazium phanerotis*. The Wallich names were nomina nuda; *Asplenium cataractarum* must be considered as sensu Moritzi, non Blume, 1828; *Diplazium phanerotis* Kunze was a validly and previously published name. The epithet *phanerotis* was available under the genus *Asplenium*, and Mettenius should have adopted it and made the new combination "*Asplenium phanerotis* (Kunze) Mett." instead of taking up the nomen nudum *A. porrectum* Wallich. Therefore, *Asplenium porrectum* Mett. must be considered a superfluous name by Art. 63 of the Code and be typified by the type of the name that ought to have been adopted, namely, *Diplazium phanerotis*. (Type: Java, *Zollinger* 1491). Mettenius saw *Zollinger* 1491, but he wrongly cites it as from Malacca rather than Java. There are some other errors in Mettenius' treatment of this species. Wallich used the name *Asplenium porrectum* twice, first under no. 204 for a plant from Penang and Singapore (wrongly cited by Mettenius as from Nepal) and again under no. 224 for a plant from Mauritius which is utterly different. Wallich realized this later and rejected both of his *porrectum* names, on p. 63 of his List, renaming no. 204 as *Asplenium multisoratum* Wallich (wrongly cited by Mettenius as *A. "multisorum"*) and no. 224 as *Asplenium polyodon* Wallich. The latter, *A. polyodon* Wallich [not *A. polyodon* Forst., 1786], is still a nomen nudum, considered a synonym of *A. protensum* Schrad.

TYPE: A specimen in the Brussels Herbarium with the name *A. varium* in the hand of Roxburgh and the number 2409 (Morton photograph 19600). According to Roxburgh it was collected in Amboina, which means probably by Christopher Smith. Since duplicates of this collection have not been seen in other herbaria, it is likely that this specimen is unique and a holotype.

26. ASPLENIUM WOODWARDIOIDES Roxburgh, Calcutta Journ. Nat. Hist. 4:500. 1844, non Bernh., 1803. =? **Diplazium maximum** (D. Don) C. Chr. Ind. Fil. 235. 1905 (as to basionym, excl. synonymy).

TYPE: Not determined. The type came from Chittagong, East Bengal (now East Pakistan), where it was collected by Buchanan-Hamilton. No specimen from the Roxburgh Herbarium determined as *A. woodwardioides* has been located nor any collected at Chittagong by Buchanan-Hamilton.

Don described two species from Nepal, *Asplenium latifolium* Don and *A. maximum* Don, both from collections made by Wallich. In the "Index Filicum," these were united under the name *Diplazium maximum*, but it is clear from Don's descriptions that there were two different species—*A. latifolium* D. Don (non Bory, 1803) having the pinnules merely toothed or slightly lobed (i.e., the same species or closely related to *D. dilatatum* Blume) and *A. maximum* D. Don with the pinnules deeply

pinnatifid (clearly related to *D. polypodioides* Blume). The holotypes of Don's species have not been located; they are seemingly not in the British Museum where they might be expected. Although Don's new species were based on his own collections, Wallich ignored Don's names and provided new names in publishing his own "A Numerical List." It will be necessary to examine closely the specimens of Wallich's collection in the East India Company Herbarium to decide which of Wallich's names apply to *A. maximum* D. Don; several are to be considered, especially *A. diversifolium* Wallich, *A. frondosum* Wallich, and *A. polymorphum* Wallich, and perhaps others. It seems clear, however, that Don's name applies to the plant of Nepal and northern India generally called *D. polypodioides* Blume (syn. *D. asperum* Blume). The true *D. polypodioides* of Java, Malaya, and southern India and Ceylon has a spiny stipe and rachis. The Himalayan plant is closely allied but, as pointed out by Sledge (Bull. Brit. Mus. Nat. Hist. Bot. 2:308. 1962), differs apparently constantly in having smooth rather than prickly stipes and rhachises. This Himalayan plant I take to be the true *D. maximum*. If it should prove to be the same as *D. polypodioides*, the name *D. maximum* has priority.

Roxburgh's description of his *A. woodwardioides* is "Stipes smooth; fronds (2 feet high), subovate, smooth, alternately-bipinnate; leaflets broad-ensiform; those of the inferior pinnae pinnatifid; of the upper more or less serrate. Fructifications in oblong spots along the nerve, but forming a sharp angle with it. Involucre separating towards the nerve. Found at Chittagong by Dr. Buchanan." As may be seen, Roxburgh stressed that both the stipe and the fronds were "smooth," not prickly or scaly, which agrees with *D. maximum*, and the identification with *D. maximum*, at least sens. lat., is confirmed by the description of the pinnules of the lower pinnae as "pinnatifid," which would exclude *D. dilatatum* Blume. Roxburgh's name is a later homonym, and therefore it can never be adopted to replace any other name that might be found to be identical with it.

A plant that appears to be a variety of *D. maximum*, rather than *D. polypodioides*, because of the nonspiny stipe and rhachis follows:

27. DIPLAZIUM MAXIMUM (D. Don) C. Chr. var. **vestitum** (C. B. Clarke) Morton, comb. nov.

Asplenium polypodioides var. *vestitum* C. B. Clarke, Trans. Linn. Soc. II, Bot. 1:501. 1880. Type: "Central Himalaya," with no specimens

cited. Lectotype: Darjeeling, 6500 ft alt, June 19, 1884, *Clarke* 35382D (K, Morton photograph 20640).

This variety, which may prove to be a distinct species, has the rhachis and rhachillas rather densely scaly and pubescent. I have seen two recent collections from Lebong Forest, Darjeeling: *Mehra* 7 (US) and *Bir* 121 (US). The other syntypes of var. *vestitum* are: Darjeeling, 6500 ft alt, Sept. 2, 1875, *Clarke* 27329 (K) and Rungbee, Darjeeling, 5500 ft alt, Aug. 17, 1869, *Clarke* 8646 (2 sheets, K, Morton photograph 20641).

28. BLECHNUM ANGUSTIFOLIUM Roxburgh, Calcutta Journ. Nat. Hist. 4:501. 1844, non Willd., 1810. =**Taenitis blechnoides** (Willd.) Swartz f. **angustifolia** (Roxburgh) Morton, comb. nov.

TYPE: A specimen of the Roxburgh Herbarium from the Martius Hebarium in Brussels annotated by me as *B. angustifolium* Roxb. (Morton photograph 19830). According to the unpublished list of Roxburgh species represented in the Martius Herbarium, *Blechnum angustifolium* Roxburgh is present, and this collection is the only possible one, even though the name *B. angustifolium* is not written on the sheet; the specimen agrees with the original description, and since the plant is distinctive there cannot be any doubt. No other specimens of *B. angustifolium* have been found in Kew, the British Museum, or Geneva, and so this specimen may be presumed to be unique and therefore the holotype. The locality was stated by Roxburgh to be the Molucca Islands, where it was probably collected by Christopher Smith.

Taenitis blechnoides normally has pinnate blades. The juvenile blades are said to be simple, as is expected, but they are seldom collected. Roxburgh's specimen of *B. angustifolium* is, however, not juvenile, because it has mature sori; it represents a form with simple mature blades, evidently rare, because, although I have seen many typical specimens of *T. blechnoides*, this Roxburgh collection is the only one with simple mature blades. It is to be doubted, however, that this condition would be constant.

29. BLECHNUM DECURRENS Roxburgh, Calcutta Journ. Nat. Hist. 4:502. 1844. =**Blechnum finlaysonianum** Wallich ex Hook. & Grev. Icon. Fil. 2: *t. 225*. 1831. Type: Penang?, "Herb. Finlayson." Apparently this is not in the general herbarium at Kew, although there is an old collection without collector or locality that might be an isotype. There is an isotype—a fragment only—in the Greville Herbarium now in Edinburgh (Morton photograph 11560), and this can serve as lectotype until a better specimen is discovered. Wallich gave no locality, but Hooker and Greville guessed Penang.

Blechnum finlaysonianum Wallich, Num. List 65, no. 2172. 1830, nom. nud.

Asplenium penangianum Wallich, Num. List 8, no. 196. 1830, nom. nud. Based on Penang, *Wallich* in 1822 (K, Morton photograph 11558).

TYPE: A specimen in the herbarium in Brussels with the name in the

hand of Roxburgh (Morton photograph 20002). This is the only collection found at Kew, Brussels, or Geneva, and so may be considered unique and the holotype. It came from Prince of Wales Island, i.e., Penang Island, Malaya, and was collected by Dr. Hunter, according to Roxburgh.

Blechnum decurrens has not been properly placed. In the "Index Filicum," it was referred doubtfully to *Blechnum orientale* L. It was properly determined as *B. finlaysonianum* by Bommer on an annotation slip with the type.

30. BLECHNUM GLABRUM Roxburgh, Calcutta Journ. Nat. Hist. 4:502. 1844. =**Taenitis blechnoides** (Willd.) Swartz, Syn. Fil. 24, 220. 1806. Based on *Pteris blechnoides* Willd. Phytogr. 13, *t. 9, f. 3*. 1794. Type: India, *Klein* (B, Herb. Willd.).

LECTOTYPE: Two sheets in Brussels with the name in the hand of Roxburgh (Morton photographs 19828 and 19829). An isotype is in the East India Company Herbarium ex Herb. Roxburgh, no. 141-2 (Morton photograph 20658). The only locality cited by Roxburgh is Prince of Wales Island, i.e., Penang Island, Malaya, and so these specimens may be presumed to be from there.

Another specimen is in the East India Company Herbarium Kew, no. 141-2 (Morton photographs 15722 and 19592b); this also has the name in the hand of Roxburgh and is doubtless a part of the same collection as the lectotype. The original description cites "*Taenitis blechnoides*. Sw. Wall. Cat. 62, No. 141," which refers to this specimen sent to Wallich by Roxburgh. The intent is *Taenitis blechnoides* sensu Wallich. In point of fact, Wallich did identify his no. 141 correctly as *T. blechnoides*.

Dr. Holttum has recently published "A Re-definition of the Fern-genus Taenitis Willd." (Blumea 16:87–95. 1968) in which *Taenitis* is enlarged to contain 15 species, including the types of the genera *Holttumiella* and *Platytaenia* and many species formerly referred to *Syngramma* and *Schizoloma*.

31. BLECHNUM MOLUCCANUM Roxburgh, Calcutta Journ. Nat. Hist. 4:502. 1844, non Desv., 1811. =**Blechnum orientale** L. Sp. Pl. 1077. 1753 (by typographical error as "*B. occidentale*," the epithets "*occidentale*" and "*orientale*" were accidentally reversed).

LECTOTYPE: A collection in Brussels with the name *Blechnum moluccanum* written in the hand of Roxburgh and with the date May 28 (Morton photograph 19997). Roxburgh cited "Prince of Wales Islands, Moluccas, etc." thus indicating that he had more than one specimen in hand. It cannot be determined if the specimen chosen as lectotype came from the Prince of Wales Island, i.e., Penang Island, or the Moluccas. There is another sheet in Brussels (Morton photograph 19998) which is doubtless a part of the same collection as the lectotype. A sheet in Geneva (Morton photograph 16837) is also a part of the Roxburgh Herbarium and bears the locality

"Moluccas"; however, I do not choose it as lectotype because the name is not in Roxburgh's hand.

The original description cites as a synonym "*Blechnum orientale,* Linn. Wall. Cat. 61, No. 57," but this does not mean that Roxburgh was renaming the Linnaean species. This citation was added by Griffith and was intended to mean that Roxburgh's species *B. moluccanum* was *B. orientale* sensu Wallich's Catalogue by no. 57 (actually no. 57-6, which is the Roxburgh collection sent to Wallich (Morton photograph 15728 taken at Kew).

32. CYATHEA PINNATA Roxburgh, Calcutta Journ. Nat. Hist. 4:517. 1844. =**Cyathea moluccana** R. Brown ex Desv. Mém. Soc. Linn. Paris 6:322. 1827. Type: Molucca Islands, *C. Smith* (holotype BM).

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in Roxburgh's hand and the number 2429 (Morton photograph 19853). There is also a duplicate in Brussels (Morton photograph 19854). Additional isotypes are in Geneva, with a ticket reading "Prince of Wales Island, Dr. Roxburgh" (Morton photograph 16876), and in the East India Company Herbarium, no. 179-2 (K, Morton photograph 15724). The locality stated by Roxburgh is Prince of Wales Island, i.e., Penang Island, Malaya, where it was collected by W. Roxburgh, Jr.

Holttum has this placed correctly as a synonym of *C. moluccana;* cf. Flora Malesiana II, 1(2):143. 1963, for a full synonymy.

33. CYATHEA TRIPINNATIFIDA Roxburgh, Calcutta Journ. Nat. Hist. 4:518. 1844.

LECTOTYPE: Holttum (Fl. Males. II, 1(2):156. 1963) cites the type as "Herb. Wallich n. 7076, Moluccas (CAL?; dupl. at K, BM) [*Wallich* 7076 was not collected by Wallich, but by Roxburgh]," but this can hardly be considered as a definitive choice of a lectotype, for Holttum seems to have thought that perhaps there was a holotype in Calcutta, but there are no Roxburgh specimens in Calcutta. Griffith, who published Roxburgh's fern species, commented that not a scrap of Roxburgh's material was left in Calcutta. The holotypes, where these can be determined, are in Roxburgh's personal herbarium now in Brussels. I designate two Roxburgh sheets in the Brussels Herbarium as lectotype (Morton photographs 4881, 4882, 19856, 19857), which are evidently parts of the same frond; one of the sheets bears the name in Roxburgh's hand. A duplicate, doubtless a part of the same frond, is in Geneva marked "Ind. Orient. Dr. Roxburgh" (Morton photographs 6536, 16893). Another duplicate is in the East India Company Herbarium, no. 7076 (Morton photograph 15724); in the general herbarium at Kew is a specimen labeled "Amboyna, Mr. Webb," which means that this is probably collected on Amboina by C. Smith and received from Webb. It is doubtless an isotype. Another isotype is in the British Museum, as cited by Holttum.

According to Holttum's treatement in the "Flora Malesiana," this species is endemic in Amboina. In the original description

Griffith added a reference to "*C. excelsa*, Sw. Wall. Cat. 63, No. 181 (sub nomine *C. bipinnatifidae*)," but this was only with a query.

It appears that a specimen in Geneva (Morton photograph 6536) is part of a specimen collected in Amboina by Christopher Smith (no. 3279).

34. DAVALLIA ANGUSTIFOLIA Roxburgh, Calcutta Journ. Nat. Hist. 4:513. 1844. =**Humata angustata** (Wall. ex Hook. & Grev.) J. Smith, Journ. Bot. Hook. 3:416. 1841. Type: Singapore, *Wallich* in 1822 (isotype in E. Ind. Co. Herb. no. 242, Morton photograph 15731, lower left-hand specimen).

Davallia angustata Wallich ex Hook. & Grev. Icon. Fil. 2: *t. 231.* 1831.

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh, from Prince of Wales Island, i.e., Penang Island; it bears a field label in the hand of W. Roxburgh, Jr., reading: "Grows on the trunks of trees which are well shaded. It runs along this trunk for 6–8–12 feet and perhaps more. It is sent in the list you will receive." An isotype is in the East India Company Herbarium, no. 242-2 (Morton photograph 15731), two top plants; the lower right-hand plant is from Penang, collected by Wallich in 1822, which was not mentioned by Wallich or by Hooker and Greville, but was probably included in Wallich's original concept of his *Davallia angustata.*

The citation added to Roxburgh's original description by the editor, Griffith, "*D. angustata* Wall. Cat. 63, No. 242" does not mean that Roxburgh's species was intended as a renaming of *D. angustata* Wallich, but merely that Roxburgh's species was included by Wallich under his no. 242, actually no. 242-2, as shown by the reference to page 63.

Roxburgh's *Davallia angustifolia* is quite the same as *D. angustata* Wallich, which is a good species and not a synonym of *Humata heterophylla* as the "Index Filicum" has it. It differs in the leaves not being dimorphic and in the fertile ones not being lobed.

35. DAVALLIA CORDIFOLIA Roxburgh, Calcutta Journ. Nat. Hist. 4:514. 1844. =**Humata trifoliata** Cav. Descr. 273. 1802. Type: Marianna Islands, *Née,* according to Cavanilles; Christensen (Dansk Bot. Ark. 9(3):26. 1937) suggested that Nee's plant may have come from the Philippine Islands, since the species had not been collected again in the Mariannas, and since it could be matched by Philippine specimens; however, unknown to Christensen, Hosokawa had reported it again the previous year (Trans. Nat. Hist. Soc. Formosa 26:121. 1936) from Alamagan, one of the smaller Mariannas Islands, under the synonymous name *Humata lepida* (K. B. Presl) Moore, as pointed out by Wagner (Occ. Pap. Bern. P. Bishop Mus. 19:85. 1948). Thus the original locality was correct, but the species must be very rare in the Mariannas.

Davallia serrata Willd. *in* L. Sp. Pl. ed. 4, 5:467. 1810. An illegitimate change of epithet in transferring *Humata trifoliata* to *Davallia.*

Humata serrata (Willd.) Desv. Mém. Soc. Linn. Paris 6:323. 1827. An illegitimate name, since the earliest available epithet *trifoliata* was not adopted.

TYPE: No herbarium specimen of *D. cordifolia* has been located. Roxburgh's type came from "mountains north of Rohilcund," i.e., the present Rohilkhand, in the Northern United Provinces, Division of Agra.

This species has had to be placed from description only. In the "Index Filicum," it is referred to *Humata repens* (L. f.) Diels, which was an aggregate as treated. *Humata repens* was based on *Adiantum repens* L. f. Suppl. 446. 1781. The type came from the Ile de France, i.e., Mauritius, and was collected by Sonnerat and transmitted by Thouin. The holotype is in the herbarium of Linnaeus fil. in the J. E. Smith Herbarium (no. 1635.21) in the Linnean Society, London (Morton photograph 20298). It is a good specimen, typical of the species as it grows in Mauritius, where the plants are small, long-stalked, not very divided, and not dimorphic. The plants from the Philippine Islands, Malaya, and India that have been called *H. repens* agree with *H. trifoliata* Cav., according to the study by Christensen (Dansk Bot. Ark. 8(3):26. 1937). Additional synonymy for *H. trifoliata* is given by Copeland in his Fern Flora of the Philippines (1:177. 1958). Copeland also maintains *H. repens* as a native of the Philippines, although with doubt.

Apparently true *H. trifoliata* occurs in Sumatra and Borneo. The larger and more divided plants of Java, New Caledonia, the Admiralties, and perhaps Fiji and Samoa (*Humata serrata* Brack., non Desv.) seem to be best called *Humata alpina* (Blume) Moore, Ind. Fil. XCII. 1857, as recognized in the "Index Filicum, Suppl. 3," which is based on *Davallia alpina* Blume (Enum. Pl. Jav. 2:231. 1828). As lectotype of *D. alpina,* I designate a specimen in Leiden from Mount Gedé, Java, collected by Blume and with the name "alpina" in Blume's hand (Morton photograph 1523). This probably is the actual holotype. A second sheet lacking the locality is in Leiden also, which probably represents an isotype (Morton photograph 1514).

36. DAVALLIA LONGIFOLIA Roxburgh, Calcutta Journ. Nat. Hist. 4:514. 1844, =**Grammitis alata** (Blume) Morton, comb. nov.

Davallia alata Blume, Enum. Pl. Jav. 2:230. 1828. "In fissuris rupium Javae," fide Blume. Lectotype: Raab, Java, *Zippel* (L. Morton photograph 845). Several other syntypes are at Leiden, collected by Blume.

Prosaptia alata (Blume) Christ, Ann. Jard. Bot. Buitenzorg 20:127. 1905.

Ctenopteris alata (Blume) Holtt. Fl. Malaya, Ferns 2:232. 1954.

TYPE: No specimen from Roxburgh has been located. The type was collected on Prince of Wales Island, i.e., Penang Island, by W. Roxburgh, Jr.

In the "Index Filicum," *D. longifolia* Roxb. was referred without doubt to *Davallia alata* Blume, and from the description it appears that this is surely right.

Prosaptia does not appear to differ from the species of *Grammitis* sect. *Cryptosorus* (cf. Morton, Contr. U.S. Nat. Herb. 38:90. 1967) that have sunken sori, except in having the sori submarginal. It could perhaps rank as a distinct section.

37. DAVALLIA MOLUCCANA Roxburgh, Calcutta Journ. Nat. Hist. 4:516. 1844, non Blume. =**Tapeinidium moluccanum** (Blume) C. Chr. Gard. Bull. Str. Settl. 4:399. 1929. Based on *Davallia moluccana* Blume, Enum. Pl. Jav. 237. 1828.

Davallia amboynensis Hook. Sp. Fil. 1:178, *t. 56C.* 1846. A renaming of *Davallia moluccana* Roxburgh, non Blume.

Tapeinidium amboynensis (Hook.) C. Chr. Ind. Fil. 631. 1906.

LECTOTYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19825). There is an isotype in Brussels, with the name not in Roxburgh's hand (Morton photograph 19824), one in the British Museum marked "Amboyna, Chr. Smith" (Morton photograph 15589), and one in Geneva marked "Moluccas, Dr. Roxburgh" (Morton photographs 6533, 16747). Roxburgh indicated his species as from the Molucca Islands; these collections show that the species was collected in Amboina by Christopher Smith.

Roxburgh assigned the name *Davallia moluccana* to this species long before Blume chose the same name for one of his species. Hooker assumed (without having seen Blume's type) that the Roxburgh species was different and renamed it *Davallia amboynensis*, since Roxburgh's name although proposed in manuscript earlier than Blume's was not published until later, in 1844; from Hooker's extensive footnote, it appears that he had just received the Roxburgh publication while he was writing the account of *Davallia;* he cites it from a reprint rather than from the original Calcutta Journal. In addition to Roxburgh, Hooker cited collections from Amboina in "Herb. Banks" (i.e., British Museum) and in his own herbarium collected by "A. Smith" received from Webb. The specimen in the British Museum referred to is clearly C. Smith, i.e., Christopher Smith; Hooker's "A. Smith" is either a typographical error or an error on the part of Webb; I believe that Christopher Smith was the only Smith who collected in Amboina in the early years. In his recent revision of *Tapeinidium* (Blumea 15:545–556. 1967), Kramer indicated as lectotype of *D. amboynensis* this Kew specimen collected by "A. Smith." But as indicated above, *D.*

amboynensis, was a renaming of *D. moluccana* Roxburgh, non Blume, and so it must have the same type as Roxburgh's species. The Kew collection mentioned, although surely as isotype of Roxburgh's species, was doubtless not seen by Roxburgh and so it is not a suitable lectotype.

Kramer states that the type of *Davallia moluccana* Blume is a *Saccoloma* rather than a *Tapeinidium*, following Mettenius. But as indicated by Christensen (Gard. Bull. Str. Settl. 4:399. 1929), Mettenius obtained his concept from a specimen in Leiden that had been identified as *Davallia moluccana* Blume by Blume only with a query. The specimen I take to be the holotype, or at least the most suitable lectotype, is one in Leiden with the name *Davallia "moluccensis* nobis" in Blume's own hand; it is from Amboina, collected by Reinwardt (Morton photograph 2281); Blume changed "*moluccensis*" to *moluccana* in his publication. This type shows that Blume's species is indeed the same as Roxburgh's *Davallia moluccana*, both authors having hit upon the same specific epithet independently.

38. DAVALLIA MULTIFLORA Roxburgh, Calcutta Journ. Nat. Hist. 4:515, *t. xxxi*, left hand. 1844. =**Nephrolepis multiflora** (Roxburgh) Jarrett ex Morton, comb. nov.

LECTOTYPE: A specimen in the Brussels Herbarium originally named *Davallia* with a species name now mostly cut off, this subsequently changed to *Polypodium davallioides*, and identified later as *Nephrolepis exaltata* by Baker and *N. hirsutula* by Bommer (Morton photograph 19638). According to Roxburgh the species is native to "the interior parts of Bengal, Nepaul, etc." Judging from my photograph, the same species is represented in the herbarium of the East India Company at Kew, where it is filed as no. 1031, although it should be 1031-6, i.e., *Polypodium davallioides* Roxburgh (Morton photograph 19582). Griffith indicated that *Davallia multiflora* Roxburgh occurred under the name *Polypodium davallioides* also.

In the "Index Filicum," *Davallia multiflora* Roxburgh is said to "=*Humata gaimardiana* vel *Nephrolepis* sp. (hirsutula?)." This confusion was occasioned by the editor Griffith, who added to Roxburgh's manuscript a reference to "*D. parallela*, Wall. Cat. 63, No. 251," which is plainly an error. Griffith should have added this Wallich reference under *Davallia pectinata* Smith of Roxburgh's manuscript, since *D. pectinata* sensu Roxburgh is clearly the same as *D. parallela* Wallich, i.e., a species of *Humata*. Roxburgh's description and published illustration, as well as the unpublished painting at Kew, show that Roxburgh's plant was a *Nephrolepis* and not a *Humata*.

Roxburgh's description is fairly good, as is the published drawing (*t. XXXI*, left hand). The specimen selected as lecto-

type is believed authentic because it was originally determined by Roxburgh as a *Davallia*, and *D. multiflora* is the only species of *Nephrolepis* described as a *Davallia* by Roxburgh; the original species name has been mostly cut off leaving only the top of some of the letters visible, but they are consistent with the name *multiflora*. More importantly, the specimen agrees well with the original description, as for instance the crowded pinnae, which are indeed almost imbricate in this specimen, in the shape of the blades and pinnae, including the auricles, and in the indusia being submarginal, reniform and opening outwardly. Especially the apex of the blade and the basal, somewhat reduced pinnae are exactly like the published illustration. It is therefore likely that this lectotype is truly authentic and perhaps an actual holotype.

Indian specimens of this species have been generally identified as either *Nephrolepis exaltata* (L.) Schott or *N. hirsutula* (Forst.) K. B. Presl, but Dr. Jarrett regards them as distinct (both lack short hairs on the upper side of the pinna midribs). In the shape of the indusia and their submarginal position, the species appears to be closer to *N. exaltata* than to *N. hirsutula*, with which, however, it can be easily confused. Some of the material in cultivation as *N. hirsutula* is probably *N. multiflora*. New World specimens identified as *N. multiflora* are actually *N. exaltata*.

39. DAVALLIA PECTINATA sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:514. 1844. =**Humata pectinata** (J. E. Smith) Desv. Mém. Soc. Linn. Paris 6:323. 1827.

AUTHENTIC MATERIAL: East Ind. Co. Herb., no. 251-2 (K, Morton photograph 15732, upper plant). This collection is named *Davallia multiflora* Roxburgh and is so cited in Wallich's "Numerical List," p. 63 under no. 251-2, but this was an error, the name having been transposed somehow to the wrong plant. This plant, no. 251-2, is Roxburgh's *D. pectinata*, which was not considered a new species but was credited to Smith, and not his *D. multiflora*. According to Roxburgh it was "found on the northern boundary of Oude by A. Gott," which refers to the area later known as the United Provinces of Agra and Oudh, India. The true *Davallia multiflora* Roxburgh is a *Nephrolepis*, as shown by the description and drawing.

Roxburgh identified his plant correctly, it appears, from his description and from this specimen. I am not sure that *Humata pectinata* has ever again been found in Oudh, but there is no reason that it could not occur there. It grows in Burma, as indicated by Beddome (under the synonymous name *Humata parallela*).

The type of *Davallia pectinata* J. E. Smith is in the J. E.

Smith Herbarium, no. 1635-19, in the Linnean Society, London (Morton photograph 20297, excluding the small plant at upper left, which is Malacca, June, 1796, *Christopher Smith*). The specimen is labeled "Ind. or. Soc. Unit. Frat. 1786" and according to Smith was collected by D. Hurloch, presumably a missionary. Smith also cited "eandem forte in Otheite legit Nelson. H. Banks." The word "forte" (=perhaps) indicates that this second specimen is not a type but was referred to the species with some doubt. This specimen is also in the J. E. Smith Herbarium (Morton photograph 20299, left-hand plant) marked as "Otaheite, Nelson ex hb. Banks." It is marked as "*D. pectinata* var." Smith described the lowest segments as "auriculatis semipinnatisve"; the "auriculatis" is true of the type, and the "semipinnatisve" came from this Nelson specimen from Tahiti, which may or may not be separable taxonomically. It is not definite where the type of *D. pectinata* may have come from, since in the eighteenth century the term "India orientalis" did not mean eastern India but what we might call the "East Indies," a sort of general term including Malay, Singapore, and Malaysian Islands, as well as India; since it agrees with plants from Singapore, it may well have come from there.

Hooker (Sp. Fil. 1:153. 1845) misunderstood Smith's *D. pectinata*, which he misapplied to the plant from Tahiti represented by the Nelson collection, and redescribed the true *D. pectinata* as *D. parallela* Wallich, the latter based in part on Wallich List no. 251 from Singapore, collected by Wallich in 1822 (East Ind. Co. Herb. no. 251, Morton photograph 15732, lower plant). However, since Hooker cited *Nephrodium gaimardianum* Gaud. as a straight synonym of *D. parallela*, the latter becomes a superfluous name, since the epithet "*gaimardianum*" was available in *Davallia* and should have been used. In fact, Presl had tentatively proposed *D. gaimardiana* in his "Tentamen" (1836), only to delete it in the errata at the end (p. 290) in favor of his *Nephrolepis gaimardiana*.

40. DAVALLIA PILOSA Roxburgh, Calcutta Journ. Nat. Hist. 4:515, *t. 32* (right hand). 1844. =**Microlepia speluncae** (L.) Moore, Ind. Fil. XCIII. 1857, var. **speluncae.**

LECOTYPES: A specimen in the Brussels Herbarium named by Roxburgh *Polypodium ciliatum?* and reidentified by Baker as *Davallia speluncae* (Morton photograph 19818).

No specimen named *Davallia pilosa* Roxburgh has been found. The reason for connecting the specimen chosen as lectotype is that Roxburgh indicated that his illustration was under the

name of *Polypodium ciliatum*, and this sheet does bear the name *Polypodium ciliatum*. The query present doubtless indicated Roxburgh's doubt about the species being truly a *Polypodium*. When he decided to describe it as a *Davallia*, he changed the specific epithet from *ciliatum* to *pilosa*.

Roxburgh's published drawing and the copy at Kew are both poor, and one could not possibly identify the species from them. Roxburgh's description, however, is rather detailed; the lectotype chosen agrees with the description, and it may be considered truly authentic and very likely the actual holotype. According to Roxburgh, it came from the Delta of the Ganges, from where it was introduced into the Botanic Garden in Calcutta by Buchanan-Hamilton. It is most likely that no herbarium specimen was made of the plant in the wild and that the specimen at hand came from the plant cultivated in the Botanic Garden.

In Sledge's treatment *D. pilosa* is placed as a doubtful synonym of *M. speluncae* var. *pubescens* (Hook.) Sledge. The lectotype, however, shows that *D. pilosa* is typical *M. speluncae* as it grows in the type locality, Ceylon.

41. DAVALLIA SERRATA Roxburgh, Calcutta Journ. Nat. Hist. 4:514. 1844, non Willd., 1810. = **Tápeinidium pinnatum** (Cav.) C. Chr. Ind. Fil. 213. 1905. Type: Philippine Islands, *Née*.

TYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19916). Since this is the only specimen seen in any herbarium, it is likely unique and a holotype. It came from the Prince of Wales Island (i.e., Penang Island) according to Roxburgh, where it was collected by W. Roxburgh, Jr.

In the "Index Filicum," the citation "Hk. sp. 1:174. 1846 = *biserrata* Bl.)," following the entry for *Davallia serrata* Roxburgh is an error. The "*Davallia serrata*" of Hooker at the place cited is not the same species as *D. serrata* Roxburgh, but an inadvertent error by Hooker for *Davallia biserrata* Blume, also a species of *Tapeinidium*, a somewhat dubious one but different from *T. pinnatum* (Cav.) C. Chr. A true synonym is *Davallia flagellifera* Wallich ex Hook. & Grev. Icon. Fil. 2: *t. 183*. 1830 [or 1831?], the type of which also came from Penang Island (*Wallich* in 1822, Num. List no. 243, isotypes BR, Morton photographs 19826, 19827); this species has been omitted from the "Index Filicum," except for the citation of the invalid nomen nudum "*D. flagellifera* Wall. List n. 243. 1828." Hooker and Greville gave a complete description and illustration.

42. DAVALLIA TRAPEZIFORMIS Roxburgh, Calcutta Journ. Nat. Hist. 4:516. 1844. = **Microlepia pilosiuscula** (J. E. Smith) Morton, comb. nov.
Davallia pilosiuscula J. E. Smith *in* Rees, Cycloped. 11: *Davallia* no. 10. 1808. Syntypes: Honimoa, July, 1797, *Christopher Smith*, and Amboina, 1796, *Christopher Smith*. These two specimens are in the J. E. Smith Herbarium in the Linnean Society, London, nos. 1635-17 and 1635-18 (Morton photographs 20295 and 20296 respectively). I designate the specimen from Amboina as lectotype.
Microlepia trapeziformis Kuhn, Chaeopt. 27. 1882.
Microlepia speluncae var. *pubescens* (Hook.) Sledge, Kew Bull. 1956: 525, at least in part.

LECTOTYPE: A specimen in the Brussels Herbarium with the name *Polypodium saccatum* and the number 2404 in the hand of Roxburgh (Morton photograph 19819). The species came from the Moluccas according to Roxburgh.

The name *"Polypodium saccatum"* that Roxburgh originally applied to this species was based on the sorus, which Roxburgh described as "involucre . . . forming a pouch." When he reconsidered and decided to place the plant in the genus *Davallia* rather than *Polypodium,* he changed the specific epithet to *trapeziformis* (referring to his description of the leaflets as "subtrapeziform"), doubtless for the reason that all Davallias have the "involucre" somewhat pouchlike or saccate.

The lectotype is matched by a second specimen in Brussels also identified as *Polypodium saccatum,* although not in Roxburgh's hand (Morton photograph 19820). These specimens were undoubtedly collected for Roxburgh by Christopher Smith—like Roxburgh's other Molucca collections—and they match the lectotype above for *Davallia pilosiuscula.* Thus it appears that Roxburgh's species came from Amboina. J. E. Smith had a second collection of his *D. pilosiuscula,* that from Honimoa, which is slightly larger and more divided. Roxburgh had this too, and he annotated it as "not well ascertained, probably a luxuriant specimen of *saccatum* as it has the same involucre." This specimen was doubtless included in Roxburgh's description, for he wrote that the fronds were "alternately bipinnate and tripinnatifid," the bipinnate applying to the plant from Amboina and the tripinnatifid to the more divided plant from Honimoa. A duplicate of this larger plant also is in Brussels, which by comparison with the plants in the J. E. Smith Herbarium can be presumed to be from Honimoa collected by Christopher Smith.

Other specimens of this species were evidently collected by Smith in some quantity. One of these is in the East India Company Herbarium, no. 262-4 at Kew (Morton photographs 15734, 19583, at left), which agrees with the lectotype chosen;

undoubtedly it came from Amboina, collected by C. Smith. A similar specimen in Geneva, determined as *Polypodium saccatum* Roxb. (Morton photograph 16641), has only the locality "Ind. or." Another sheet of the same thing in Geneva, marked "Amboina, *Christ. Smith*," lacks the name *Polypodium saccatum* but is determined as *Davallia polypodioides* (Morton photograph 6531). Another specimen in Geneva from "Moluccas, Dr. Roxburgh" has been named *Polypodium dubium* wrongly by someone other than Roxburgh (Morton photograph 6543). Another specimen collected by C. Smith in the Moluccas is from Gilolo Island (i.e., the present Halmahera Island) and was probably not seen by either J. E. Smith or Roxburgh, and so is not authentic.

The group of species centering around *Microlepia speluncae* is exceedingly difficult to study from herbarium specimens. Alston in his paper on the ferns of the J. E. Smith Herbarium was the first to identify *Davallia pilosiuscula* J. E. Smith; he stated that the species was "probably conspecific with the type of *M. speluncae* from Ceylon in Hermann's herbarium" (Phil. Journ. Sci. 50:177. 1933). Material from Ceylon identified by Sledge as agreeing with the Hermann type is, however, rather different. The hairs on the rhachillas of the pinnae are elongate, and many-septate, with conspicuous cross walls; the hairs on the segments are few and coarse. The plants from Amboina and Honimoa, and probably also at least most of those from Java and Sumatra, are finely and densely pilosulous, the hairs of both the rhachillas and segments being short, horizontally spreading, and only one or two cells long. I feel that these plants can hardly be conspecific. I venture to propose a new combination because the name of Smith is long prior to any other name that might apply to these Malaysian plants, and so it will likely stand when these plants are monographically studied and better understood. Sledge based his *M. speluncae* var. *pubescens* on *Davallia polypodioides* var. *pubescens* Hook. Sp. Fil. 1:182. 1846, but did not typify this name. Hooker cited three different numbers of Wallich, and the localities of Singapore, Penang, Martaban, Assam, Mergui, Java, and Macalisberg in South Africa. Considering this geographically wide range, Hooker's var. *pubescens* is probably a mixture. The plant from Java likely included plants that I refer to *M. pilosiuscula;* however, I have not seen the collection cited—*Zollinger* 513.

It is clear from the above discussion that the name *Microlepia trapeziformis* (Roxburgh) Kuhn has been misused for an entirely different species, an identification of *D. trapeziformis* Roxburgh

as being synonymous with *D. rhomboidea* Wallich going back to Moore's "Index Filicum." Kuhn picked up the name, without discussing it or its type, and he was followed by Christensen in the "Index Filicum." The name has been generally accepted since, as by Holttum in his "Ferns of Malaya" and by Sledge (Kew Bull. 1956:526), without verification. The species, misidentified as *M. trapeziformis*, is, as shown by Sledge, quite different from *M. speluncae* in its pubescence; the hairs on the rhachillas of the pinnae are coarse, stiff, and antrorsely appressed; the segments are broader and more rounded, and the whole plant coarser in appearance. This species is widespread in Asia (in Ceylon, India, Thailand, Pahang, Tonkin, and Yunnan) and occurs also in Java and Sumatra. I doubt that it occurs in the Molucca Islands, however, where the type of *D. trapeziformis* came from. The proper name of this species appears to be *Microlepia rhomboidea* (Wallich ex Kunze) Prantl, Arb. Bot. Gart. Breslau 1:31. 1892, based on *Davallia rhomboidea* Wallich ex Kunze, Bot. Zeit. 8:158. 1850. The original *Davallia rhomboidea* Wallich, Num. List no. 257. 1829, was a nomen nudum.

These collections should be restudied, both at Kew, the Linnean Society, and in Geneva, to make sure that I have them right. It may be that the two plants in the Smith Herbarium do represent different species, the one from Amboina being *M. trapeziformis* and the one from Honimoa being *M. dubia.*

43. DICKSONIA MOLUCCANA Roxburgh, Calcutta Journ. Nat. Hist. 4:517. 1844, non Blume, 1828. =**Cystodium sorbifolium** (J. E. Smith) J. Smith *in* Hook & Bauer, Gen. Fil. *t. 96.* 1841.

Dicksonia sorbifolia J. E. Smith *in* Rees, Cycl. 11: unpaged. 1808. TYPE: Honimoa, Ceram, Indonesia, *Christopher Smith,* July, 1797 (Herb. Smith no. 1636.4, LINN, Morton photograph 20301).

LECTOTYPE: Honimoa, *Christopher Smith* 326 in 1797, BR (Morton photograph 19642). Roxburgh's *Dicksonia moluccana* was founded on a part of the same collection on which *D. sorbifolia* was based.

Two collections are in the British Museum. One is a single pinna from "Ins. Molucc." and one has parts of five pinnae matching the preceding marked as "Amboyna," both collected by C. Smith; these may be and probably are part of the same collection and thus isotypes, the "Amboyna" being an error for Honimoa (Morton photographs 6875 and 6633). A good illustration of this interesting monotypic genus is given by Holttum (Fl. Males. II, 1(2):163. 1963). An account of the gametophye was given by Lenette R. Atkinson (Amer. Fern Journ. 55:32–35. 1965) and of the anatomy by Sen and Mittra (Amer. Fern Journ. 56: 97–101. 1966).

Another specimen in Kew (Morton photograph 15652) is noted as "Moluccas, *Wallich*"; this agrees wholly with the other specimens seen and is surely a part of the same collection of Christopher Smith given to Wallich by either Roxburgh or J. E. Smith, for Wallich did not collect in the Moluccas.

The reference added by Griffith was to Wallich's List no. 2173, which was a typographical error for no. 2174, a specimen of *D. moluccana* Roxburgh doubtless entered from the lectotype indicated above. There is no specimen now under no. 2174 in the East India Company Herbarium.

44. EQUISETUM DEBILE Roxburgh ex DC. *in* Vaucher, Mem. Soc. Phys. Hist. Nat. Genève 1:387. 1822 or 1821); Calcutta Journ. Nat. Hist. 4:468, *t. 26* (middle plant). 1844. =**Equisetum ramosissimum** Desf. subsp. **debile** (Roxburgh) Hauke, Amer. Fern Journ. 52:33. 1962.

LECTOTYPE: A plant in the J. E. Smith Herbarium, Linnean Society, London, no. 1648-1, from Calcutta, India, collected by Roxburgh (Morton photograph 20335). A similar plant, but lacking strobiles, is in the British Museum (Natural History) (Morton photograph 7775). Because of the close similarity, a drawing by Roxburgh at Kew (no. 1921, Morton photograph 15887) might have been made from the plant in the Smith Herbarium, with some artistic rearrangement.

In his treatment of *E. debile* in his "A Taxonomic Monograph of the Genus Equisetum Subgenus Hippochaete" (Nova Hedwigia Beih. 8:1–123. 1963), Hauke cites the type as being in the De-Candolle Herbarium in Geneva, collected at Serampore, near Calcutta, by Griffith (no. 919), but this is obviously impossible, since Griffith was only about 11 years old at the time *E. debile* was described in 1821 or 1822; he did not begin collecting in India until 1835. Alston searched in Geneva for a type unsuccessfully, but probably one is there, perhaps a specimen that is unlabeled or without the indication of Roxburgh as the collector. If a specimen is located eventually it will become the holotype, and the lectotype will be abandoned. According to the original description, Vaucher did see a specimen, but only part of a branch; the description was taken from a manuscript by De-Candolle.

45. HEMIONITIS CORDATA Roxburgh ex Hook. & Grev. Icon. Fil. 1: *t. 64.* 1828. =**Hemionitis arifolia** (Burm. f.) Moore, Ind. Fil. 114. 1859. *Asplenium arifolium* Burm. f. Fl. Ind. 231. 1768. Type: India, *Burmann.* Morton photo 3863, which is labeled TYPUS, is not *Hemionitis* but has been determined by Alston as *Acrostichum aureum* L., of which it is a juvenile specimen with a simple blade. If this really is the type, then the correct name for *H. arifolia* will be *Hemionitis cordata* Roxburgh ex Hook. & Grev.

Hemionitis cordifolia Roxburgh. See entry 46.

Hemionitis hastata R. Brown ex Wallich, Num. List. 65, no. 2170. 1830, nom. nud. Based on Mysore, India, *Buchanan-Hamilton* (BM, Morton photograph 7501, upper right-hand plants).

Acrostichum trinerve Buchanan-Hamilton in sched. (BM, Mysore, India, *Buchanan-Hamilton*, Morton photograph 7501).

TYPE: Hooker and Greville cited three collections: one from "Ind. Orient," collected by Roxburgh; one from Madras by Shuter (K, probably the plant on the right mounted on the sheet with *Wight* 51, Morton photograph 20642); and one from low places near Calcutta "ad locis depressis veget. sub pluviis," collected by Wallich in 1820 (K, Morton photograph 20643). The Roxburgh specimen should be the lectotype, if one can be located at Kew or Edinburgh, considering that the species was attributed to Roxburgh.

46. HEMIONITIS CORDIFOLIA Roxburgh, Calcutta Journ. Nat. Hist. 4:500. 1844. =**Hemionitis arifolia** (Burm. f.) Moore, Ind. Fil. 114. 1859.

Hemionitis cordata Roxburgh ex Hook. & Grev. Icon. Fil. 1: *t. 64.* 1828.

LECTOTYPE: Herb. East India Company, no. 44 (K, Morton photograph 14670). This sheet contains three collections according to the label: (1) Bengal, 1807 [*Roxburgh*]; (2) Rangoon, 1827 [*Wallich*]; (3) "var. frond. fert. lobatis." The latter, which is not localized, is represented by a blade with the stipe cut off; it is not exactly "lobate" but rather irregularly sinuate. The middle plant on this sheet is the Roxburgh collection, since it matches a Roxburgh collection in the British Museum. The two plants at the sides are the Wallich collection. The isolectotype in the British Museum is marked "prope H. B. Calcuttae," i.e., near the Calcutta Botanical Garden (Morton photograph 15781). Copies of authentic Roxburgh drawings are at Kew (no. 1750) and the British Museum (Morton photograph 15770). According to Voigt (Hort. Suburb. Calcutt. 734. 1845), the Roxburgh specimen came from Serampore, Bengal.

In addition to the specimens cited above I have seen a Roxburgh specimen at Oxford determined as *"Acrostichum hastatum,"* which has also been identified as *"Cyclophorus"* in some later hand (Morton photograph 20203). There is also a specimen in Brussels with the name *Hemionitis cordata* Roxburgh, from Madras, India, received from Hooker; this specimen cannot be a type, since it is from the wrong locality, but it may have been collected by Roxburgh while he was stationed in Madras prior to going to Calcutta.

47. HEMIONITIS RETICULATA Roxburgh, Calcutta Journ. Nat. Hist. 4:501. 1844, non Forst., 1768. =**Antrophyum callifolium** Blume, Enum. Pl. Jav. 111. 1828. TYPE: Java, *Blume* 95 (holotype L, Morton photograph 349; this sheet is the holotype because it is the only specimen labeled in Blume's hand and the only one collected by Blume).

LECTOTYPE: A sheet in the Brussels Herbarium collected in Honimoa, Ceram, Indonesia, Roxburgh Herb. 1174 (Morton photograph 19908). This sheet could be considered a holotype perhaps, since it is the only one seen with locality and with the name in the hand of Roxburgh. Roxburgh gave

the locality as "Moluccas," which includes the island of Honimoa. As other Roxburgh specimens from the Moluccas, this one was undoubtedly collected by Christopher Smith. Another sheet in Brussels, also from the Roxburgh Herbarium, has two detached fronds: the one at the left is identical with the lectotype and is doubtless part of the same collection; the smaller one at the right is different—longer stipitate blades and with a midrib that is not prominent and not black. I exclude this frond from the type collection. Very likely from my photograph the same plant is represented by the Roxburgh collection in the East India Company Herbarium no. 40-2 (Morton photograph 14668, two bottom plants), and this too is excluded as type material.

Hemionitis reticulata Roxburgh is omitted from the "Index Filicum," presumably because Christensen assumed that Roxburgh intended *H. reticulata* Forst. Roxburgh, however, does not mention Forster, and he puts an "R." after the species name, thus indicating himself as the author of the species, as he did with the others he described as new. He selected the epithet "*reticulata*" independently from Forster; it is a natural choice, considering the conspicuously reticulate venation of the blades. Roxburgh's species came from the Moluccas and Forster's was definitely indicated by Forster as from the Society Islands. The citation added to *H. reticulata* Roxburgh, "*Antrophyum reticulatum* Kaulf. Wall. Cat. 61, No. 40," was added by the editor Griffith, since Kaulfuss published his *A. reticulatum* long after Roxburgh's death, as did Wallich his "Catalogue"; Griffith intended merely to note that a Roxburgh collection was cited in Wallich's "Catalogue" under number 40; this collection, actually no. 40-2, is the one mentioned above as probably to be excluded from the type material.

The species of *Antrophyum* are by no means clear. Someone, possibly Bommer, has identified the Roxburgh lectotype as *A. semicostatum* Blume, but this is clearly wrong, for that species belongs to the group of species having clavate paraphyses, whereas *H. reticulata* Roxburgh has delicate, hairlike paraphyses. The nearest species appears to be *A. callifolium* Blume, although the midrib may be more prominent and darker than is usual in that species. This character may have been stressed too much in delimiting the species. The Roxburgh species is perhaps equally close to the true *A. reticulatum* (Forst.) Kaulf. from Tahiti. The latter may be based on a mixture. Christensen, in his "Ferns of Samoa," indicated that the Forster specimen he saw in the British Museum had two elements, one corresponding to *A. grevillei* Balfour (with elongate, narrow fronds with elongate, parallel sori) and one he took to be typical *A. reticulatum*. I have seen a different specimen in the British Museum (Morton photograph

7610) which also has two elements, one identified as *A. lessonii* Bory (with short, broad blades) and another I take to be typical *A. reticulatum.*

48. ISOËTES CAPSULARIS Roxburgh, Calcutta Journ. Nat. Hist. 4:470. 1844.
=**Vallisneria spiralis L.**

The original description is as follows:

"Capsules peduncled, 1-celled. Leaves linear flat.

"This plant grows in deep standing sweet water, with *Valisneria spiralis*, etc.

"Stoles creeping, jointed, tufts of filiform roots descend from each joint, and from 4 to 12 leaves ascend; they are like those of *Valisneria spiralis*, very delicate, 2–3 feet long, a quarter of an inch broad, and slightly serrated near the apex. From the alae of the leaves arise several diaphanous, cordate capsules standing on short peduncles; they consist of 1-cell, formed of two valves, opening from the apex, the seeds are numerous connected to a conical receptaculum in the centre.

"I have not seen the male flowers."

At first sight this is a truly amazing description, for this is a description of *Vallisneria spiralis* L., as shown by the description of the stolons as creeping and jointed (*Isoëtes* has a fleshly corm, not creeping, jointed stems), of the leaves as two to three feet long and serrate near apex (the leaves of *Isoëtes* are, at least usually, shorter than this and not serrate), and of the capsules as being pedunculate and bivalvate (*Isoëtes* has of course "capsules," i.e., sporangia, borne sunken within the bases of the leaves, and not pedunculate or valvate).

It seems likely that Griffith, the editor and publisher of Roxburgh's posthumous work, accidentally inserted a description of *Vallisneria* for the intended description of an *Isoëtes.* This is borne out by two facts. Roxburgh's published drawing, *op. cit. t. 26,* left-hand plant, is labeled *Isoëtes capsularis,* and it is truly and obviously an *Isoëtes.* Secondly, Griffith later published a description and discussion of *Isoëtes capsularis,* which is cited as being the *I. capsularis* of Roxburgh (Notul. ad Pl. Asiat. 2: 572–580. 1849; Icon. Pl. Asiat: *t. 116–118.* 1849), and Griffith's description and drawings are obviously truly *Isoëtes,* very likely *I. coromandelina* L. f.

Nevertheless, since the original description of *I. capsularis* Roxburgh applies altogether to *Vallisneria spiralis,* except the illustration, it seems that one is forced to consider it a synonym of *V. spiralis,* even though this may not have been Roxburgh's intent.

49. ISOËTES COROMANDELINA sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:470. 1884, prob. not L. =? **Isoëtes indica** Pant & Srivastava, Proc. Nat. Inst. Sci. India 28, B:246. 1962. Type: Ram Nai village, Rews, Madhya Pradesh, India, *Pant* Pt. 2A (K, not seen).

AUTHENTIC MATERIAL: A specimen from "Ind. or." collected by Roxburgh in the J. E. Smith Herbarium, no. 1650.3, Linnean Society London (Morton photograph 20341). The plant came from the Circar Mountains, according to Roxburgh, i.e., in northern Madras Province, India.

The above specimen indicated as authentic does not bear the name *I. coromandelina* in Roxburgh's hand, but it agrees with Roxburgh's description. Roxburgh considered his plant the same as the Linnaean species and not as new, and he may have been right. The sporangia, however, are enormous (for *Isoëtes*) in these plants in the Smith Herbarium, about 2 cm. long, in which they seem to agree better with the recently described *I. indica* than with *I. coromandelina* L., which has the sporangia only about 12 mm. long. The identity with *I. indica*, however, would have to be proved by a comparison between the holotype at Kew and the specimen in the Smith Herbarium, something I have not done. *Isoëtes indica* has been known only from the type locality in Madhya Pradesh, in central India. According to the paper "The Genus Isoëtes in India," by Pant and Srivastava, it differs from *I. coromandelina* as follows:

Triradiate ridges of megaspores normally simple; ends of megaspore tubercles generally rounded; sterile cells absent; microspores smooth or rugose to papillate ..... *I. coromandelina*

Triradiate ridges in megaspores often branched; ends of megaspore tubercles generally tapering; sterile cells present in outer megasporangia; microspores tuberculate ..... *I. indica*

50. LINDSAEA BIPINNATA Roxburgh, Calcutta Journ. Nat. Hist. 4:511. 1844. =**Lindsaea parasitica** (Roxburgh) Hieron. Hedwigia 62:14. 1920.

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the number 2242 and the names *Lindsaea* and *Vittaria* in Roxburgh's hand (Morton photographs 5152, 19914). I believe that this specimen is not only a suitable lectotype, but that it is actually the holotype. According to Roxburgh, the species was collected on Prince of Wales Island (i.e., Penang Island) by W. Roxburgh [Jr.]. There is a duplicate of this lectotype in Geneva, indicated as from the Prince of Wales Island, collected by Dr. Roxburgh (Morton photograph 6567).

Roxburgh usually wrote his specific names on the specimens in his own collection, but he was lax about doing this with his species of *Vittaria* and *Lindsaea*. There are four *Lindsaea* specimens in Roxburgh's collections in Brussels from Roxburgh's own personal herbarium, but only one of these (*V. lunulata*) has the name in Roxburgh's hand. The other three specimens, however, can be

matched up clearly with the described species. These four specimens represent the four species described from the Prince of Wales Island (Penang Island) for the collections of W. Roxburgh, Jr. Two of these (*V. parasitica* and *V. interrupta*) have labels in the hand of W. Roxburgh, Jr., giving something about the habitat. The remaining specimen, the one chosen above as lectotype of *L. bipinnata,* has no such label, but the plant corresponds with the description of *L. bipinnata.* Roxburgh remarked: "It is exceeding like *Vittaria parasitica,* and only a little larger, and more robust." This is the fact; the specimen is so much like *V. parasitica* that it does represent the same species, only the plant is a little larger and more robust than the type of *V. parasitica.* It probably represents the terrestrial state of this species described as *Lindsaea scandens* var. *terrestris* Holttum, but it appears doubtful that this terrestrial form ought to be given any taxonomic recognition. Holttum indicates that it is larger than the epiphytic plants, but this might be expected since terrestrial plants would have better soil and nutrients than epiphytic plants.

Roxburgh's reason for describing this same species in two different genera, *Vittaria* and *Lindsaea,* is that he misunderstood *Vittaria.* One has to remember that he was working in Calcutta only 10 or 15 years after the first publication of *Vittaria,* that he did not have Swartz' "Synopsis Filicum," of 1806 available, and that he had no authentic material of anything available for comparison. Roxburgh defined *Vittaria* as follows: "Fructifications in an uninterrupted marginal line. Involucre double, uninterrupted; one from the surface separating outwards; the other from the margin of the frond turned in, separating inwards." Following is J. E. Smiths' original description of *Vittaria* in 1793: "Fructif. in linea marginali continua. Involucrum duplex, continuum; alterum superficiarium, exterius dehiscens, aliud e margine ipsius frondis, inflexo, interius dehiscens." This description by Smith is highly misleading because it is completely wrong, and if we had only this description *Vittaria* would have to be listed as a dubious genus. The only way to identify *Vittaria* is by Smith's citation of *Pteris lineata* L., for we know that this plant belongs to the genus *Vittaria.* But *Pteris lineata* does not have marginal sori and it does not have any "involucrum" (i.e., indusium), let alone an inner and an outer indusium, such as is present in such genera as *Pteridium* and *Paesia.* Roxburgh did have a true *Vittaria,* which he referred to *V. lineata* incorrectly, but his other Vittarias are all Lindsaeas. Where the leaf margin appeared to be slightly recurved, Roxburgh considered this as an

outer indusium and consequently described the "involucres" as "double" and the species as Vittarias. However, in the case of his *Lindsaea bipinnata* he wrote: "I am not certain if ever the thin edge of the leaf is turned in (over the inner) involucre. I am rather inclined to think not; at least I have not been able to discover that it is," and therefore he described this species as a *Lindsaea*, remarking how much it resembled his *V. parasitica*. There is a good reason why Roxburgh was not able to find an outer indusium, because this "difference" is illusory. In no *Lindsaea* is there ever anything corresponding to an outer indusium. In *Lindsaea* the margins of the fertile pinnules are sometimes just a little thinner and perhaps slightly recurved, but they never approach anything that might be called an outer indusium.

51. LINDSAEA ODORATA Roxburgh, Calcutta Journ. Nat. Hist. 4:511. 1844. *Lindsaea cultrata* sensu auctt. (e.g., Hook. & Grev. Icon. Fil. 2:*t. 144*. 1829 or 1830), non *Adiantum cultratum* Willd., 1794.

LECTOTYPE: No herbarium specimen of this species has been seen. The drawing by Roxburgh at Kew, no. 2578 (Morton photograph 15860) was selected as lectotype by Kramer (Blume 15:567. 1967 [1968]). Roxburgh's plant came from the Garrow Hills, i.e., Garo Hills, Assam, India.

The illustration undoubtedly represents the species usually called *L. cultrata* incorrectly, as in the "Index Filicum."

52. LYCOPODIUM ARISTATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:473. 1844, non Humb. & Bonpl. ex Willd., 1810. = **? Selaginella tamariscina** (Palisot) Spring, Bull. Acad. Brux. 10:136. 1843.

Lycopodium aristatum Roxburgh, Hort. Bengal. 75. 1814, nom. nud. Cited is "Dill. Musc. *t. 66, f. 7*," which might seem to validate the publication of Roxburgh's name by this reference to Dillenius' pre-Linnaean book, but in this case it does not, for there is no "*t. 66, f. 7*" in Dillenius' work. This is a slip on Roxburgh's part. It is not certain which Dillenius figure Roxburgh really intended. In the manuscript as published in 1844, Roxburgh states: "It resembles most Dillenius's figure t. 66, f. 7," thus repeating the same erroneous citation, and showing also that Roxburgh never intended his *L. aristatum* to be based on a Dillenius figure.

?*Stachygynandrum tamariscinum* Palisot, Prodr. Aeth. 106. 1805. Type: East Indies (Isotype B, Willd. Herb. 19372–2, ex Palisot de Beauvois).

TYPE: No herbarium specimens have been located. According to Roxburgh: "From China this pretty little species was brought to the Botanical Garden in Calcutta in 1812, where it grows freely in a rich, shaded, moist soil." According to Roxburgh's "Hortus Bengalensis" (p. 75. 1814) it was collected by W. Kerr in China in 1812.

The original description is: "Patent (1–3 inches long), dichotomous. Leaves as well as the superficial scales alternate, bifarious, ovate-falcate; membrane margined, apex ending in a bristle or arista." In Reed's "Index Selaginellarum" (p. 25. 1968), *Lyco-*

podium aristatum Roxburgh is equated to *Selaginella uncinata* (Desv.) Spring as though this were established. In conversation with Reed, it was stated that this disposition was taken from Alston's manuscript "Index." In this "Index," in card form in the British Museum, under *Selaginella aristata* (Roxburgh) Scott, Alston has merely written casually "cfr. *S. uncinata*," which is far from making a definite reduction to synonymy. It is apparent that Alston had not seen a specimen and that this was merely a guess from the description. I would not agree, for *Selaginella uncinata* is a rather large trailing species with blades often 12 inches long or more; also the leaves are not so conspicuously aristate that Roxburgh would have commented on it and even named his species *"aristatum."* Roxburgh says his species is "little," with the fronds only one to three inches long. This small size coupled with the conspicuously aristate leaves suggests at once *S. tamariscina*. I do not know where in China W. Kerr might have been, but from the early date (1812) it is likely that he was not too far from the coast, and indeed he might have been in Hong Kong, where *S. tamariscina* is common; this species does occur at other places along the China coast and lowlands of the interior.

Since Roxburgh's species is an illegitimate later homonym, its identification is not very important.

53. LYCOPODIUM CERNUUM sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:472. 1844. =**Lycopodium cernuum** L. Sp. Pl. 1103. 1753, sens. lat.

AUTHENTIC MATERIAL: Two specimens in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photographs 19965, 19966). A specimen in the East India Company Herbarium, no. 139-6 [or 130-6?] with the name in Roxburgh's hand (Morton photograph 19591 bis).

Roxburgh understood *L. cernuum* in its usual sense. This species is really rather uniform, considering its extensive range in both hemispheres, and it is hard to see how Nessel could have recognized some 43 varieties. The segregation of any subspecies or varieties will be difficult or impossible.

54. LYCOPODIUM FILIFORME Roxburgh, Calcutta Journ. Nat. Hist. 4:473. 1844, non Swartz, 1806. =**Lycopodium salvinioides** (Herter) Alston *in* Lecomte, Fl. Gén. L'Indo-Chine 7(2):553. 1951.

Urostachys salvinioides Herter, Bot. Arch., Königsberg 3:18. Jan. 15, 1923.[1] Type: Herter lists many syntypes; to my knowledge, no lectotype has ever been chosen.

[1] Republished in Phil. Journ. Sci. 22(1):67. Jan. 24, 1923, according to Herter (Ind. Lycopod. 102. 1944).

LECTOTYPE: A specimen in the Brussels Herbarium named in the hand of Roxburgh, the parts indicated by red letters as "c" and "d"; the fragment indicated as "e" has been considered different (Morton photographs 5218, 19976). The locality was indicated as Sumatra by Roxburgh. This and *L. rotundifolium* are the only species described by Roxburgh from Sumatra; there is no indication who may have supplied the material; so far as I am aware, Roxburgh never collected in Sumatra.

In some herbaria, as in the British Museum, *Lycopodium filiforme* Roxburgh is recognized under its own name as a distinct species. That can hardly be, however, since the name is an illegitimate later homonym. The type appears to represent a form of *L. phlegmaria* L. with rather small, spreading leaves and very elongate, slender spikes. The various varieties described by Blume are not clearly differentiated; it may be that Roxburgh's species would agree better with var. *pellucidum* Blume or var. *gracilescens* Blume than it would with var. *laxum*. I have not seen the types of any of these varieties.

55. LYCOPODIUM FURCATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:475. 1844. =**Selaginella atroviridis** (Wallich ex Hook. & Grev.) Spring, Flora 21:183. 1838.

Lycopodium atroviride Wallich ex Hook. & Grev. Icon. Fil. 1: *t. 39*. 1827. Syntypes: Prince of Wales Island [=Penang Island, Malaya], *Wallich* and Herb. Hort. Soc. London. The Wallich specimen at Kew I designate as lectotype (Morton photograph 20656). The Wallich plants are the two upper and the center plants. The lower plant and perhaps the lower left-hand plant are from Tenasserim, collected by Griffith, and perhaps are a different species. An isosyntype is in the East India Company Herbarium, no. 120 (K, Morton photograph 19588e). The collection of the specimen that Hooker and Greville first saw in the herbarium of the Royal Horticultural Society was without indication of collector; the collector could have been Wallich, in which case the two syntypes could have been part of the same gathering, or it is possibly a Roxburgh collection and an isotype of *L. furcatum* Roxburgh.

Lycopodium intermedium Blume, Enum. Pl. Jav. 2:269. 1828. Type: Java, *Blume* (not seen).

Selaginella intermedia (Blume) Spring, Bull. Acad. Brux. 10:144. 1843.

LECTOTYPE: *Roxburgh*, East India Company Herbarium. no. 120-2 right-hand plant with name in hand of Roxburgh (K, Morton photographs 15719, 19589). The left-hand plant on this sheet is Wall. Cat. 120-4, Herb. Finlayson (not a type). An isotype is in the Brussels Herbarium labeled *Lycopodium hymenophyllum* in the hand of Roxburgh. Evidently Roxburgh first assigned the name *L. hymenophyllum* and later changed it to *L. furcatum*. Contrary to my usual designation of specimens in the Brussels Herbarium as lectotypes, I choose rather the one in the East India Company Herbarium which has the name *furcatum* in Roxburgh's hand.

Alston in his treatment of the Indian species of *Selaginella* adopted the name *S. intermedia* (Blume) Spring for this species,

but he had the dates wrong. He indicated *L. intermedium* Blume as being published in 1830 and *L. atroviride* Wallich ex Hook. & Grev. in 1831, and if this were true then Blume's name would have priority. Actually *L. atroviride* was published in 1827 and *L. intermedium* in 1828. It is clear that *L. atroviride* was published prior to Blume's treatment, for Blume adopted the name *atroviride* for one of his species and cited the Hooker and Greville reference. This error has been perpetuated in Reed's "Index Selaginellarum," where also *S. atroviridis* is erroneously listed as "*S. atrovirens.*"

56. LYCOPODIUM IMBRICATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:475. 1844, non Forssk., 1775. =**Selaginella bryopteris** (L.) Baker, Journ. Bot. Brit. & For. 22:376. 1884.

Lycopodium bryopteris L. Sp. Pl. 1103. 1753. Concerning the typification, see Alston, Journ. Bot. Brit. & For. 69:252. 1931.

TYPE: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19955). There is according to Alston a Roxburgh specimen of *L. imbricatum* in the DeCandolle Herbarium in Geneva. These specimens have been identified as *Selaginella bryopteris* by Alston (Proc. Nat. Inst. Sci. India 11:221. 1945), doubtless correctly. Roxburgh received his specimens from H. Colebrooke, who collected them in Behar, now Bihar, India.

57. LYCOPODIUM LAEVIGATUM sensu Roxburgh, Calcutta Journ. Nat. Hist. 4: 474. 1844, non Lam. 1791. =**Selaginella plana** (Desv.) Hieron. *in* Engl. & Prantl, Nat. Pflanzenfam. 1(4):703. 1901.

AUTHENTIC MATERIAL: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19956). A fragment of apparently the same plant is in the East India Company Herbarium, Kew, mounted on the same sheet as *L. mimosoides*, no. 128-2 (Morton photograph 19591a); this small fragment, named *L. laevigatum* by Roxburgh, was probably overlooked by Alston in studying this sheet. Roxburgh indicated his material as from the "Malay Islands."

Roxburgh did not consider his species new, but cited Lamarck as the author. He, however, misidentified his plant, for *L. laevigatum* Lam. is a quite different plant from Madagascar, which is now properly *Selaginella pectinata* Spring [=*Selaginella laevigata* (Lam.) Baker, 1867, non *S. laevigata* (Willd.) Spring, 1840]; concerning the synonymy, see Alston *in* C. Chr., Dansk. Bot. Ark. 7:196. 1932.

58. LYCOPODIUM MIMOSOIDES Roxburgh, Calcutta Journ. Nat. Hist. 4:473. 1844. =**Selaginella wallichii** (Hook. & Grev.) Spring *in* Mart. Fl. Bras. 1(2):124. 1840.

Lycopodium elegans Wallich, Num. List. no. 128. 1829, non Desv. 1827. Based on a collection from Penang and Singapore, *Wallich*.

Lycopodium wallichii Hook. & Grev. *in* Hook. Bot. Misc. 2:384. 1831. Type: Penang and Singapore, *Wallich* List. no. 128.

LECTOTYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh and the number 13 (Morton photograph 19958). According to Roxburgh, the species was collected in the Moluccas. An isotype is in the East India Company Herbarium, no. 128-2, with the name in Roxburgh's hand (K, Morton photographs 15721, 19591). Another isotype is in the British Museum (Morton photograph 19530).

This is a characteristic and easily recognized species. Roxburgh remarked that the branches "are exactly like the pinnae of a fine-leaved *Mimosa,*" which is true and explains his choice of specific epithet. Alston (Gard. Bull. Str. Settl. 8:49. 1934) writes: "Roxburgh's specimens of *L. mimosoides* Roxb. in Hb. Brit. Mus. are labelled 'Ind. Orient.'; they were probably collected in Penang," and a note by Alston on the sheet in the British Museum referred to states that the "Moluccas" of Roxburgh included all the East Indies. This remark is not borne out by my studies. Roxburgh's "Moluccas" really are the Molucca Islands, from where he received collections made by his assistant Christopher Smith; they were mostly from Amboina, but a few were from other islands—Honimoa, Ternate, and Gilolo. *Selaginella wallichii* has not since been collected in the Moluccas, but it could be there, since it does grow in Sumatra, not so far away. It is possible that in this instance Roxburgh did inadvertently write "Moluccas" rather than "Malay Islands," the term he usually used for Penang Island.

59. LYCOPODIUM PECTINATUM sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:474. 1844, non Lam., 1791. =**Selaginella willdenovii** (Desv.) Baker, Gard. Chron. 1867:783, 950. 1867.

AUTHENTIC MATERIAL: A specimen in the Brussels Herbarium named in the hand of Roxburgh (Morton photograph 19959, left-hand specimen). According to Roxburgh a native of the Malay Islands. This sheet has a fragment of another species of *Selaginella* on it at bottom right, which is mounted here by mistake, for it is evidently a part of the authentic material of *L. laevigatum* sensu Roxburgh, i.e., *Selaginella plana* (Desv.) Hieron. Another authentic specimen of *L. pectinatum* sensu Roxburgh is in the East India Company Herbarium, no. 126-7 (K, Morton photograph 1959Oc), with the name in the hand of Roxburgh and annotated as *S. willdenovii* by Alston; the other specimens on this sheet are different; they are from Cortallum and represent *S. pouzolziana*, fide Alston.

Roxburgh did not intend this as a new species, but credited it to Lamarck. *Lycopodium pectinatum* Lam. was a mixture, based on plants from Mauritius and literature references to both East Indian plants and American plants. Desvaux (*in* Poiret *in* Lam. Encycl. Méth. Suppl. 3:540. 1813 [1814]) essentially selected a lectotype by restricting the Lamarck name to the specimen from

Mauritius and indicated that it was probably the same as *Lycopodium obtusum* Swartz, i.e., *Selaginella concinna* (Swartz) Spring, the type of which is also from Mauritius. This disposition has been generally accepted, but I do not know whether it has been actually verified. Swartz did not indicate any type for his plant, and so that will have to be determined by the consultation of Swedish herberia, first naturally Stockholm. However, *Stachygynandrum obtusum* Palisot (Prodr. Aethiog. 113. 1805), the type of which is from Mauritius, *Bory*, is generally considered to be the same, and since Palisot's name clearly has priority over Swartz', the proper name is *Selaginella obtusa* (Palisot) Spring, Bull. Acad. Brux. 10:228. 1843.

60. LYCOPODIUM PENDULUM Roxburgh, Calcutta Journ. Nat. Hist. 4:472. 1844. =**Lycopodium carinatum** Desv. *in* Lam. Encycl. Méth. Suppl. 3:555. 1813.

LECTOTYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photographs 5207, 19961). The locality is given by Roxburgh as Amboina, and therefore the collector was Christopher Smith. Since no other specimen named *L. pendulum* by Roxburgh has been found, this may be presumed a holotype.

In Herter's "Index Lycopodiorum," *L. pendulum* is referred to *L. carinatum* Desv., and this appears to be correct. The type agrees with *Robinson* 1973 from Amboina (US).

61. LYCOPODIUM PHLEGMARIA sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:471. 1844. =**Lycopodium phlegmaria** L. Sp. Pl. 1101. 1753, sens. lat.

AUTHENTIC MATERIAL: Represented by a drawing at Kew, no. 1008 (Morton photograph 15885). No herbarium specimen has been seen. Roxburgh's material came from "the Sunderbunds, on old trunks of trees, in flower during the rains." The Sunderbunds are the present Sundarbans or Sundribuns, the swampy coastal region of the Delta of the Ganges in Bengal.

Lycopodium phlegmaria as currently recognized in Asia is obviously a mixture of several species. The Roxburgh drawing is poor, but seems to correspond with a collection from Khasia, 2,000 feet alt., of Hooker and Thomson (dupl. US). It is a plant with somewhat sparse, narrowish, spreading leaves and short, slender, mostly simple spikes. According to Prain (Rec. Bot. Surv. India 2:231–370. 1903), *L. phlegmaria* is the only species of *Lycopodium* known from the Sundribuns.

62. LYCOPODIUM PLUMOSUM sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:474. 1844, non L., 1753. =**Selaginella roxburghii** (Hook. & Grev.) Spring, Bull. Acad. Brux. 10:228. 1843.

Lycopodium plumosum Roxburgh ex Wallich, Num. List. no. 120-?3. 1830, nom. nud.

Lycopodium roxburghii Hook. & Grev. *in* Hook. Bot. Misc. 2:390. 1831. Type: *Roxburgh* ex. Herb. Wallich. Although it is not annotated as *L. roxburghii* by Hooker or Greville, the specimen labeled *L. plumosum* in the hand of Roxburgh in the East India Company Herbarium, originally sheet 120-?3 but now filed under no. 122 (Morton photograph 15720, two small fragments at the lower right-hand bottom, indicated by Alston as "syn-type?" may be selected as lectotype until an undoubted holotype is found, which might be in the Greville Herbarium in Edinburgh. In Reed's "Index Selaginellarum" (p. 195) the type is indicated as "Dr. Wallich in Herb. Roxburgh, BM," but I have not found any such specimen in the British Museum, although there may be one there; in any case, Reed has the names reversed, for it should be "Dr. Roxburgh in Herb. Wallich," Roxburgh being the collector.

AUTHENTIC MATERIAL: A specimen in the Brussels Herbarium with the name *L. plumosum* in the hand of Roxburgh (Morton photograph 19957). The specimen in the East India Company Herbarium mentioned above as the lectotype of *L. roxburghii* Hook. & Grev. is also authentic for Roxburgh's *L. plumosum*.

In Reed's "Index Selaginellarum" and by Alston, *L. plumosum* is listed as though it were a new species of Roxburgh, but Roxburgh did not really consider it new. He did not place an "R" after the name, as he did with his truly new species, and he cited a reference to *"Dill. musc. t. 66, f. 10,"* which is one of the references cited under *L. plumosum* L. It seems therefore that Roxburgh considered his plant to represent *L. plumosum* L. This agrees with Crantz' lectotypification of 1766, in which the Linnaean *L. plumosum* is restricted to Dillenius' *t. 66, f. 10;* according to this, *L. plumosum* L. is *Selaginella plumosa* (L.) K. B. Presl, a West Indian species, syn. *S. stolonifera* (Swartz) Spring. It is evident that Roxburgh misidentified his plants as *L. plumosum* L., but he still did not describe a new species. Roxburgh stated that the species was "Native in various parts of India. In Bengal it is found on rotten wood." I cannot reconcile this statement with the specimens mentioned above labeled *L. plumosum* by Roxburgh, for these plants represent *Selaginella roxburghii,* a rather characteristic species found in Malaya but not in India. In this instance Roxburgh likely used "India" to cover Malaya as well as India. From his comment about the species occurring in Bengal, it is clear that he included more than one species under his *L. plumosum*.

63. LYCOPODIUM ROTUNDIFOLIUM Roxburgh, Calcutta Journ. Nat. Hist. 4:473. 1844. =**Lycopodium nummulariifolium** Blume, Enum. Pl. Jav. 2:263. 1828. Type: Java, *Blume* (L, not seen).

TYPE: Sumatra, Roxburgh Herbarium (E-Herb. Greville). According to Hooker and Greville (Icon. Fil. *t. 212.* 1831), Roxburgh's collection is represented in the East India Company Herbarium under no. 2183, but it is not there now; it may have been misplaced. This collection does not appear to be in the general herbarium at Kew, nor at the British Museum, Brussels, or Geneva.

There is no doubt about the identification of *L. rotundifolium* Roxburgh, because Hooker and Greville's plate was drawn from an authentic Roxburgh specimen, and it is identical with the characteristic species *L. nummulariifolium* Blume. The collector who supplied Roxburgh with the type material from Sumatra is unknown.

64. MARATTIA PINNATA Roxburgh, Calcutta Journ. Nat. Hist. 4:519, 1844.
=**Angiopteris pinnata** (Roxburgh) Morton, comb. nov.
Angiopteris ruttenii van Alderw. van Rosenb., Bull. Jard. Bot. Buitenzorg II, 28:6. 1918. Type: Boren Kaloa, Ceram, 150 m., Sept. 21, 1917, *Rutten* 177 (holotype prob. BOG; isotype L, Morton photograph 439).
LECTOTYPE: A specimen in Brussels with the name in the hand of Roxburgh (Morton photograph 19951). Isotypes in Geneva (Morton photograph 16993), British Museum (Morton photograph 6529), and Kew (East Ind. Co. Herb. 187-7, consisting of two pinnules only, Morton photograph 15725).

This species has never been identified. In the "Index Filicum," it is referred with a query to *A. crassipes* Wallich ex K. B. Presl, but this is only on the basis of Wallich's having placed the single pinnule that Roxburgh evidently sent him under his *A. crassipes*. (The pinnules in this species are deciduous from the rhachilla; Roxburgh probably sent more material, but the pinnules fell off and Wallich retained only two.) The species appears to be different from the Indian and Nepalese *A. crassipes*, but it has priority, the Wallich species not having been published except as a nomen nudum until 1845, a year after Roxburgh's species. Bommer identified the lectotype as *A. dregeana* deVriese (1853), which is according to the "Index Filicum" a synonym of *A. javanica* K. B. Presl (1845). It does not appear that either of these can be the same as Roxburgh's species, since they belong in the subg. *Angiopteris*, whereas *A. pinnata* belongs in the subg. *Pseudangiopteris* K. B. Presl.

Angiopteris is the fern genus most in need of monographic study. More than a hundred species have been proposed, but why is something of mystery. They all look much alike and do not differ in obvious characters like most good species of ferns. There may be only a very few good species in the genus. I venture to transfer Roxburgh's species, however, because it is the

earliest species belonging to the subg. *Pseudangiopteris*, all the others having been proposed later by Presl, deVriese, and others. *Pseudangiopteris* may not really be a good subgenus, although the monographer DeVriese thought it was, but at least the character on which it is based—the absence of false veins—seems to be a good specific character. Roxburgh gave the locality as "Molucca Islands." The collections available to him from the Moluccas were collected by C. Smith in Amboina, Ternate, or Honimoa (Ceram). The lectotype and isotype specimens that I have examined agree with the isotype of *A. ruttenii*, from Ceram, and so *A. pinnata* likely came from Honimoa.

65. MARSILEA QUADRIFOLIA sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:469. 1844. =**Marsilea quadrifolia** L. Sp. Pl. 1099. 1753. Type: Not determined; India was included within the original geographic range assigned by Linnaeus.

AUTHENTIC MATERIAL: A Roxburgh drawing in Kew (no. 1300) and a specimen in the herbarium at Edinburgh. Another specimen, determined as *M. dentata* Roxb. and dated 1809, should be at the British Museum (Natural History).

Roxburgh illustrated the sporocarp, and it corresponds with *M. quadrifolia* as delimited by K. M. Gupta in his book "Marsilea" (Council Sci. Industr. Res., New Delhi, Bot. Monog. 2:96. 1962). Roxburgh indicated that he had seen this plant in various parts of India, and that he had searched for *M. coromandelica* Burm. f. without success.

66. OPHIOGLOSSUM CORDIFOLIUM Roxb. Calcutta Journ. Nat. Hist. 4:475. 1844.
= **Ophioglossum petiolatum** Hook. Exotic Fl. 1:56. 1823.
Ophioglossum cordifolium Roxb. ex Wall. Num. List., no. 47. 1828, nom. nud.

LECTOTYPE: A sheet in the herbarium in Brussels with the name in the hand of Roxburgh and the number 1199 (Morton photograph 19952). There is a comment by Roxburgh on the label: "Yet I now doubt if it differs specifically from *O. vulgatum.*"

Roxburgh's description agrees with this herbarium specimen. The comment that it is native to "Bengal, Moluccas, etc." indicates that Roxburgh had more than one specimen in hand, and that the sheet chosen as lectotype is thus not a holotype. The sheet of no. 47 in the herbarium of the East India Company at Kew (Morton photograph 14672) has several fronds on it. The three at the top left represent Wallich no. 47-1 from Viemora, Bengal, collected in 1808 (undoubtedly by Roxburgh) and are undoubtedly isosyntypes; the single frond at upper right

appears to be a part of the same collection. The one larger plant, the second from the right in the top row, has a label "Inter Mangiferas, H. B. C. Sept. 1825"; "H. B. C." refers to the Hort. Bot. Calcutta, and the collector was doubtless Wallich; this is not type material. The lower row of four plants are Wallich no. 47-2, collected in Courtallum by Heyne; they formed a part of Wallich's concept of *O. cordifolium* but not that of Roxburgh, although they do represent the same species. A duplicate specimen of Wallich 47-1 from Viemora, Bengal, *Roxburgh* is in US. In the "Index Filicum," *O. cordifolium* is wrongly referred to *O. pedunculosum* Desv.

There are drawings of *O. cordifolium* by Roxburgh in the British Museum (Morton photograph 15774) and at Kew.

67. **Ophioglossum filiforme** Roxburgh, Hortus Bengalensis 75. 1814; Calcutta Journ. Nat. Hist. 4:476, *t. 26, f. 3*. 1844. =**Lygodium microphyllum** (Cav.) R. Brown, Prodr. Fl. Nov. Holl. 162. 1810.

Ugena microphylla Cav. Icon. Descr. Pl. 6:76, *t. 595*. 1801. Syntypes: Marianna Islands and Philippine Islands [near Nabua (Prov. Camarines Sur, Luzon), and Samboangan], *Née* (MA, not seen).

Type: In the Hortus Bengalensis there is no description, but Rheede, Hort. Malab. 12: *t. 34*, is cited, which is sufficient to validate the publication of the name *O. filiforme*. Rheede's poor illustration *t. 34* is identified by Willdenow (*in* L. Sp. Pl. ed. 4, 5:78. 1810) as a sterile plant of the species that he calls *Hydroglossum scandens*, of which *Ugena microphylla* Cav. is cited as a synonym; Rheede's *t. 34* is similarly identified with *L. scandens* by Prantl (Untersuch. Morph. Gefässkrypt. 2:82. 1881). A specimen from the Roxburgh Herbarium now in Brussels is labeled *O. filiforme* in Roxburgh's hand (Morton photograph 4764, 19945) and surely represents Roxburgh's concept and the species that he intended to describe. According to Roxburgh (Hort. Beng. 75. 1814) it was collected in Bengal by Dr. F. Buchanan and was cultivated in the Calcutta Botanical Garden. This specimen does represent *Lygodium microphyllum*, and so it appears that Roxburgh did interpret Rheede's plate correctly. This specimen also agrees with Roxburgh's published plate *t. 26, f. 3* and with the authentic Roxburgh drawings labeled *O. filiforme* in the British Museum (Morton photograph 15572) and at Kew (no. 1741), which are indicated as having been collected at Chittagong by Buchanan-Hamilton; in Roxburgh's time Chittagong (now in East Pakistan) was included within Bengal. Thus there are no confused elements in this species.

This species is the one that has usually, at least since the time of Swartz' "Synopsis Filicum" (1806), been identified as *Lygodium scandens* (L.) Swartz, and it is too bad that its name must be changed. Alston and Holttum (Reinwardtia 5:12–14. 1959), however, showed that the original *Ophioglossum scandens* L. was based on several elements, none of which represent *L.*

scandens as interpreted by Swartz and succeeding authors. There were four literature citations, the one from the "Hortus Cliffortianus" representing *L. volubile* Swartz, the one from the "Flora Zeylanica" *L. flexuosum* L. (fertile), and the one from Breyne (copied by Morison) *L. venustum* Swartz, and finally the one from Rheede representing *L. flexuosum*. They concluded that since *L. venustum* and *L. volubile* already had received names, and generally accepted names, that *O. scandens* L. ought to be typified by the "Flora Zeylanica" reference and the corresponding specimen in the Hermann Herbarium (no. 474). Strangely enough, they make no mention of the Linnean Herbarium, in which there is a specimen (no. 1243.3 labeled *scandens* in Linnaeus' hand and also numbered "5," the number of *O. scandens* in the "Species Plantarum" (1753). It is generally agreed that when possible Linnaean species ought to be typified by specimens in the Linnean Herbarium rather than on literature citations, and in this case there is no obstacle. Fortunately for stability, this specimen in the Linnean Herbarium, which I designate as lectotype, does not represent *L. venustum* or *L. volubile*, but is clearly *L. flexuosum*, and thus *O. scandens* L. and *L. scandens* (L.) Swartz remain as synonyms of *L. flexuosum* (L.) Swartz, as indicated by Alston and Holttum.

68. OPHIOGLOSSUM FLEXUOSUM sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:477, *t. 26* p.p. (lower sterile leaflet). 1844. =**Lygodium circinnatum** (Burm. f.) Swartz, Syn. Fil. 153. 1806.

The only herbarium specimen that I have seen determined by Roxburgh as *O. flexuosum* is one in Brussels, from Amboina, no. 320, collected in 1796 (Morton photograph 19941); although not stated on the label the collector was surely Christopher Smith. There is a duplicate at the British Museum (Morton photograph 20856). This is clearly *L. circinnatum* with twice-forked sterile pinnae. That this really represents Roxburgh's concept at least in part is shown by his description of the sterile pinnae as generally palmate. Roxburgh did, however, include other material also in his concept, for he cites the Bengal name as "Bhootraj" and cites "Valli-panna. Rheed. Mal. 12, *t. 32*. bad," the latter the same reference as cited by Linnaeus under his *Ophioglossum flexuosum* and cited also by Presl as his *L. salicifolium*.

69. OPHIOGLOSSUM FURCATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:478. 1844. =?**Lygodium circinnatum** (Burm. f.) Swartz, Syn. Fil. 153. 1806.

No specimens of this species have been located. It was described from Pullo Pinang (i.e., Penang Island, Malaya). In the "Index

Filicum" it is referred to *L. circinnatum*, which is probably correct. The original description reads: "Scandent. Fronds dichotomous, ultimate divisions linear, very long, finely pinnatifid, with numerous minute spikelets."

70. OPHIOGLOSSUM SCANDENS Roxburgh, Calcutta Journ. Nat. Hist. 4:477, *t. 26* p.p. 1844. =**Lygodium flexuosum** (L.). Swartz, p.p. and **L. salicifolium** K. B. Presl, p.p.

Roxburgh intended his *O. scandens* to be that of Linnaeus, and so it is, as now lectotypified by Alston and Holttum, i.e., a synonym of *L. flexuosum* (L.) Swartz. The published *t. 26* (lower fertile pinnules) also represents *L. flexuosum*, as do three herbarium specimens that I have seen: Sin loc., *Roxburgh (G*, Morton photograph 6573), E. Ind. Co. Herb. 175-10 (K, Morton photograph 15723), and Amboina, *Christopher Smith* in 1797 (Linn. Soc., Smith Herb. 1647-7, Morton photograph 20333). It appears, however, that Roxburgh's concept was confused, because the specimen in Brussels (Morton photograph 19944) labeled *O. scandens* in Roxburgh's hand is *L. salicifolium* K. B. Presl. It appears that the drawing at BM (Morton photograph 15771) and at Kew (no. 1200) is a composite, the lower sterile pinnae being shown as forked somewhat as in *L. circinnatum* (Burm. f.) Swartz and the fertile pinnae pinnate as in *L. flexuosum*.

In the paper mentioned under *O. filiforme* by Alston and Holttum, these authors lectotypify *Ophioglossum flexuosum* L. on the basis of "Fl. zeyl. 375," i.e., a Hermann specimen from Ceylon, mistakenly stating that this is the only reference cited by Linnaeus, who in point of fact did cite another reference, namely Rheede, Hort. Malab. 12:6, *t. 32*. Since Linnaeus gives the locality as "India," and not Ceylon, it might be supposed that the Rheede reference could be chosen as lectotype; still he did cite the "Fl. zeyl." reference and so the "India" habitat is incomplete. There is a further complication not mentioned by Alston and Holttum, namely that there is a specimen in the Linnean Herbarium named by Linnaeus as *flexuosum* and also indicated as being species 6 of the "Species Plantarum." The Linnaean specimen represents the Jamaican species later described as *Lygodium volubile* Swartz. Since Linnaeus did not cite Jamaica or any American locality for his *O. flexuosum*, but did cite India, the Linnaean specimen must in this case be rejected as a type. It would be most unfortunate to transfer the application of the epithet *flexuosum* from a common Old World species to a common New World one.

Alston and Holttum (Reinwardtia 5:15. 1959) write that Singapore, *Cuming* 365 in Vienna is the type of *L. salicifolium* K. B. Presl, but this is an error, for Presl cited material from Penang, Singapore, Silhet, Irawaddi, Ava, Rajmahl, Monghur, Gualpara, Tavoy, Martaban, Nepal (all distributed by Wallich), Singapore (*Cuming* 365), and Java (*Drege* 20). The Cuming collection is thus just one of many syntypes, all of which are not conspecific; however, *Cuming* 365 is a suitable lectotype, although there is no reason to designate a specimen in Vienna; on the contrary, there is a specimen in the Presl Herbarium in Prague that should be, and is here, designated as lectotype (cf. Holttum, Novit. Bot. Inst. Bot. Univ. Carol. Prag. 1968:37. 1969).

71. OSMUNDA LANCEOLATA Roxburgh, Calcutta Journ. Nat. Hist. 4:478, *t. 27*, 1844, non Gmelin, 1768. =**Leptochilus decurrens** Blume, Enum. Pl. Jav. 206. 1828. Lectotype: "Ad pedem montis Burangrang inter lapida ad rivulos," Java, *Reinwardt* (L, Morton photograph 1582). This specimen is probably the actual holotype, for it has the name in Blume's hand; it shows one frond with the blade long-decurrent and another with the blade less decurrent, but this variation is common in this species.

LECTOTYPE: The published drawing, *t. 27*, left-hand plant. No specimen named *Osmunda lanceolata* has been located in any herbarium. The drawing is good; it was a new species when Roxburgh described it (although he picked out a later homonym for his name), but the same plant was later described by Blume as *Leptochilus decurrens*. The published drawing has two sterile leaves and one fertile. Strangely enough, the other two drawings seen are different but represent the same species. The one at Kew (no. 694, Morton photograph 15865) has four sterile leaves and two fertile, and the one at the British Museum (Morton photograph 15753) has six sterile leaves and two fertile. If a specimen can be located, it will replace the drawing as lectotype. Roxburgh did not indicate a locality, but, according to Merrill, it is from Penang.

The genus *Leptochilus* has been studied by Sledge (Ann. Mag. Nat. Hist. XII, 9:865–877. 1956), and additional synonymy for *L. decurrens* is given in his paper.

72. OSMUNDA ZEYLANICA sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:478. 1844. =**Helminthostachys zeylanica** (L.) Hook. *in* Hook. & Bauer, Gen. Fil. *t. 47*. 1844.

No specimen collected by Roxburgh has been seen, but none was searched for, since Roxburgh's use of the name *O. zeylanica* was surely correct. There is a drawing by Roxburgh (no. 1742) at Kew (Morton photograph 15866). According to Roxburgh

(Hortus Bengalensis 75. 1814), his specimen came from Amboina where it was collected by Christopher Smith.

73. POLYPODIUM ACUMINATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:490. 1844, non Houtt., 1786, non D. Don, 1825. =**Thelypteris arida** (D. Don) Morton, Amer. Fern Journ. 49:113. 1959.
Aspidium aridum D. Don, Prodr. Fl. Nepal. 4. 1825. Type: Nepal, *Wallich* (BR? photograph BM).

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19649). An isotype is in Geneva, indicated as "India orient. Dr. Roxburgh" (Morton photograph 16931). Roxburgh did not indicate a locality for this species.

This *Polypodium acuminatum* Roxburgh was based on Roxburgh's original manuscript and was published independently and without mention of *P. acuminatum* Roxburgh ex D. Don (1825). The latter was based on a Nepal collection of Wallich, whereas Roxburgh's own species was based on one of his own collections. Therefore, it seems better to regard these two species as nomenclaturally different and differently typified even though they do seem to be taxonomically equivalent. They are both later homonyms.

The lectotype is unusually large for *T. arida* and unusually glabrous. It seems to agree with material from Penang Island, and it may have been collected there by W. Roxburgh, Jr. There is another Roxburgh specimen in Brussels with a label by Roxburgh that reads: "agrees with *P. acuminatum*, but smaller" (Morton photograph 19650); Roxburgh's comment is true, for it does represent the same species, but it is a smaller, hairier, and more typical specimen of *T. arida*. Another Roxburgh collection in Brussels is labeled by Roxburgh and reads: "*Polypodium* undetermined; differs from *acuminatum* in being pubescent and having a larger and more lasting involucre"; this specimen too I identify as *T. arida*.

74. POLYPODIUM ACUTUM Roxburgh, Calcutta Journ. Nat. Hist. 4:492. 1844, non Burm. f., 1768. =**Thelypteris subalpina** (v.A.v.R.) Reed, Phytologia 17:317. 1968.
Dryopteris subalpina v.A.v.R. Bull. Bot. Jard. Buit. III, 5:200. 1922. Type: North Foramadiahi, Ternate, 1200 m alt, *Béguin 1496* (BO; isotype L, seen by Holttum).

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in Roxburgh's hand and the number 2390 (Morton photograph 19662). There is in Brussels also a sheet containing two pinnae only, doubtless a part of the same collection. According to Roxburgh, the species occurs in Amboina. An isotype is in Geneva marked as "Amboyna, Dr. Roxburgh," which has been identified (not by Roxburgh) as "*Polypodium cultratum*

Rox." There is no such species, and this is certainly an error for *P. acutum* Roxburgh (Morton photographs 6544, 16632). A specimen in the J. E. Smith Herbarium (no. 1622-75) in the Linnean Society, collected in Honimoa [Ceram] by Christopher Smith, April, 1797 (Morton photograph 20354), agrees with the lectotype and is probably an isotype; Roxburgh probably thought that all the Smith collections came from Amboina, but this one was likely among those that came from Honimoa.

The lectotype chosen was identified by Baker as *Nephrodium extensum*, but the specimen is by no means that species or nearly allied. The lowest pair of veinlets unite into an excurrent veinlet; the second pair reach the margin well above the sinus, which is necessarily almost true since the pinnae are deeply pinnatifid with only a narrow costal wing.

75. POLYPODIUM AEMULUM sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:496. 1844, non Aiton, 1789. =**Hypodematium crenatum** (Forssk.) Kuhn, von Deck. Reise 3(3):37. 1879.

Polypodium crenatum Forsk. Fl. Aeg.-Arab. 185. 1775. Type: *Forsskal* (C not seen, photograph BM).

AUTHENTIC MATERIAL: A Roxburgh specimen in the British Museum, marked *"Polypodium aemulum?"* in Roxburgh's hand. According to Roxburgh, his material came from "mountains north of Rohilcund," i.e., the present Rohilkhand, Province of Agra, Northern United Provinces.

The description by Roxburgh is: "Fronds quadri-pinnatifid, smooth, and delicate; ultimate divisions narrow-trapeziform-oblong, sides pinnatifid, or gashed and denticulate at tip. Fructifications solitary on the segments. Involucre reniform, peltate and ciliate." Roxburgh surely did not know *Polypodium aemulum* Aiton at first hand, but only through a description. His plant might seem to resemble that by a brief diagnosis, but it was different. *Polypodium aemulum* is a species of *Dryopteris* from the Azores, and nothing like it is known in India. The identity of Roxburgh's plant required a little detective work. The description of the indusia as "ciliate" ruled out *Dryopteris*, *Polystichum*, and *Arachniodes*. The quadripinnatifid, delicate blades and hairy indusia suggested *Hypodematium*, and I did find a Roxburgh specimen under *H. crenatum* in the British Museum labeled by Roxburgh as "*P. aemulum* ?." The query shows that Roxburgh had some doubt about the identity of his plant with that of Aiton. The indusium in *Hypodematium* is not truly peltate, as Roxburgh described it, although it might appear so to casual inspection; it is pubescent all over, rather than merely ciliate.

76. POLYPODIUM ARBORESCENS Roxburgh, Calcutta Journ. Nat. Hist. 4:495. 1844. =**Cyathea batjanensis** (Christ) Copel. Phil. J. Sci. 4C:45. 1909.

Alsophila batjanensis Christ *in* Warb. Monsunia 1:90. 1900. Type: Mt. Sibella, Batjan, Moluccas, 5000 ft alt, *Warburg* 17828 (P not seen; isotype B not seen).

Polypodium arboreum Roxburgh ex Wallich, Num. List no. 2226. 1830, nom. nud.

Alsophila latebrosa var. *batjanensis* Christ *in* Warb. Monsunia 1:89. 1900, nom. nud.

LECTOTYPE: A Roxburgh collection in the Brussels Herbarium with the name in Roxburgh's hand and the number 2406 (Morton photograph 19859). An isotype (probably the apical part of the same frond) is in Geneva, labeled as from "Honimoa, Dr. Roxburgh" (Morton photograph 6545). Roxburgh gave the locality as Honimoa, i.e., Ceram, where it was doubtless collected by Christopher Smith.

In the original description the editor, Griffith, added a reference to Wallich, Num. List no. 2226 with a query, a number undoubtedly referring to the present species, whose name was wrongly transcribed by Wallich as "*arboreum*" rather than *arborescens*. The specimen noted by Wallich was surely the lectotype specimen noted above from "Herb. Roxb.," which was at the time in the East India Company Herbarium under the custodianship of Wallich.

77. POLYPODIUM ATTENUATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:482. 1844, non Humb. & Bonpl. ex Willd., 1810. =**Polypodium lanceolatum** L. Sp. Pl. 1082. 1753.

Pleopeltis macrocarpa (Bory ex Willd.) Kaulf. Berlin Jahrb. Pharm. 21:41. 1820. See Pichi-Sermolli (Webbia 20:349–354. 1965) for additional comments on the nomenclature of *P. lanceolatum*.

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium bearing the name *P. attenuatum* and a label "Typus" (Morton photograph 5007). A duplicate is in the British Museum (Morton photograph 7611). According to Roxburgh the species was collected in Pullo Pinang, i.e., Penang Island, Malaya.

From my photographs and notes on the type specimens, it seems that the plants are truly *P. lanceolatum* L., but that species has been recorded in Asia only from India and not from Penang Island or elsewhere in Malaya. Perhaps Roxburgh's locality was wrongly stated, and the specimens came from southern India.

78. POLYPODIUM CONFERTUM Roxburgh, Calcutta Journ. Nat. Hist. 4:493. 1844. =**Arcypteris irregularis** (K. B. Presl) Holttum, Reinwardtia 1:193. 1951.

Polypodium irregulare K. B. Presl, Rel. Haenk. 1:25. 1825. Type: "Mexico," *Haenke* (the locality Mexico is presumably wrong and the type probably came from the Philippine Islands; it is very likely in Prague).

Aspidium difforme Blume, Enum. Pl. Jav. 1:160. 1828. Type: "In regione Buitenzorg," Java, *Blume* (holotype L, with the name in Blume's hand, Morton photograph 2318).

Polypodium eximium Kunze, Bot. Zeit. 4:424. 1846. Lectotype: Two sheets in Geneva from Java, *Zollinger* 514A, the first sheet (the blade apex) with the name "*Polypodium eximium* Kze. n. sp." in Kunze's hand, the second sheet with part of the stipe and blade base (Morton photographs 3851, 3852). The other specimen cited by Kunze, Java, *Zollinger* 514, is also represented by two sheets in Geneva (Morton photographs 3853, 3854), but these do not have the name in Kunze's hand. The two above collections may indeed be the original specimens used by Kunze in drawing up his description, and there may never have been any specimens in Kunze's own herbarium, now destroyed.

Tectaria irregularis (K. B. Presl) Copel. Phil. Journ. Sci. 2C:416. 1907.

Polypodium macrodon Reinwardt, mss. Based on a specimen in Leiden marked "H. B. [i.e., Hort. Buitenzorg] *Polypodium macrodon* R." (Morton photograph 2317). The epithet was picked up and used by Presl as *Dictyopteris macrodonta* and by Fée under the same name, but for a species that proves to be different, a Philippine species typified by *Cuming* 9[=*Arcypteris macrodonta* (Fée) Holttum, Reinwardtia 1:194. 1951]. The Reinwardt specimen with the pinnae (except the basal) very little lobed is matched by a specimen collected near Buitenzorg in 1909 (*Palmer & Bryant* 93, US).

Lectotype: A Roxburgh specimen in the Brussels Herbarium with the name in Roxburgh's hand (Morton photographs 5188, 19800); this is the basal part of a frond, with the pinnae almost fully again pinnate. A second specimen in Brussels is probably the apical part of the same frond (Morton photographs 5187, 19801). According to Roxburgh, this species came from Chittagong, in East Bengal, now East Pakistan.

In the "Index Filicum," this species was left as dubious; it has never been placed, except as Baker has correctly annotated the second sheet mentioned above as *Polypodium difforme* Blume. I follow Holttum with some hesitation in recognizing *Arcypteris* as a genus distinct from *Tectaria*. The characters need to be investigated further. Sinus teeth, the presence of which is stressed by Holttum, seem to be more often absent than present, at least on old, mature fronds, and also on fronds with the pinnae only very slightly lobed. Not enough is known about the pubescence of *Tectaria* in general to know if the characters mentioned are distinctive. Holttum's statement that the sori in *Arcypteris* are borne at the vein junctions is not borne out by his own figure 2, in which more sori are not at vein junctions than are. The character of sori irregularly scattered and exindusiate also occurs in various New World species.

79. POLYPODIUM CONFLUENS Roxburgh, Calcutta Journ. Nat. Hist. 4:494. 1844, non R. Brown, 1810. =**Ctenitis rhodolepis** (Clarke) Ching, Bull. Fan Mem. Inst. Biol. Bot. 8:300. 1938.

Nephrodium rhodolepis Clarke, Trans. Linn. Soc. II, Bot. 1:526, *t. 72*. 1880. Syntypes: "Sikkim, Assam, Khasia, alt. 5000–7000 feet; Chittagong, 150 feet, *Clarke* (very small form)." It is evident that Clarke

had several specimens in hand, which must be examined before a lectotype can be designated.

Dryopteris rhodolepis (Clarke) C. Chr. Ind. Fil. 288. 1905.

TYPE: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh and a label reading "Typus" (Morton photograph 19722). According to Roxburgh, it came from Chittagong, in East Bengal, now East Pakistan. Since this is the only specimen found in any herbarium, it may be presumed to be a holotype.

In the "Index Filicum," *P. confluens* Roxburgh, a homonym several times over, is left as a dubious species. The type has been identified as *Nephrodium intermedium* Baker by Baker, which it doubtless is, but Baker's name is a later homonym. The type is quite the smallest specimen of this species that I have seen, and it evidently corresponds to the other specimen from Chittagong mentioned by Clarke in the original description of *N. rhodolepis* as a "very small form"; it is not only smaller but less divided, being bipinnate only at the very base. The large, thin, beautifully clathrate scales are characteristic of this species.

80. POLYPODIUM CORIACEUM Roxburgh, Calcutta Journ. Nat. Hist. 4:481, *t. 28* (left). 1844, non Swartz, 1788. =**Pyrrosia angustata** (Swartz) Ching, Bull. Chin. Bot. Soc. 1:49. 1935.

Polypodium angustatum Swartz, Syn. Fil. 27, 224. 1806. Type: Tranquebar, *Rottler* (prob. S-PA, not seen).

? *Niphobolus sphaerocephalus* Hook. & Grev. Icon. Fil. 1:*t. 94*. 1828. Type: *Wallich* (K-Hb. Hook., Morton photograph 20652), which was thought by Hooker and Greville to be perhaps from Nepal, but indicated properly by Wallich under his Num. List. no. 272. 1829, as from Singapore. Hooker and Greville described the sterile leaves as completely glabrous beneath, but this is not true for *P. angustata*. The sterile blades of the type do appear to be glabrous beneath, but they are old and the stellate hairs which were once present have fallen off, except for a few. Normally this species is not glabrescent; however, it is not clearly conspecific with *P. angustata* or with *Wallich* 272 in the East India Company Herbarium (Morton photograph 20657).

? *Polypodium sphaerocephalum* (Hook. & Grev.) Wallich, Num. List no. 272. 1829. Based on *Niphobolus sphaerocephalus* Hook. & Grev.

LECTOTYPE: *Roxburgh* in East India Company Herbarium, no. 272–3 (K, Morton photograph 15737, left-hand specimen). The center and right-hand specimens on this sheet are Wall. Num. List. no. 272-2, Herb. Finlayson, not a type. According to Roxburgh, his species came from "Malay Islands and Pullo Pinang, whence introduced into this Garden [Calcutta] by Mr. W. Roxburgh, Jun." This lectotype likely came from Penang Island, where the species is common, for it matches material from there. A probable duplicate of the lectotype is in US, marked as Penang, *Dr. Wallich* no. 272. Wallich's own no. 272, the type material of *Niphobolus sphaerocephalus* Hook. & Grev., came from Singapore [Hooker and Greville guessed Nepal wrongly in the original publication], and Wallich's only material of this

species from Penang would presumably have been received from Roxburgh, and so this specimen is doubtless collected by Roxburgh; it agrees with the lectotype cited above. A Roxburgh drawing at Kew (no. 1744, Morton photograph 15867) is labeled *Polypodium coriaceum* and is doubtless intended for this species; it shows the rhizome as too thick and is otherwise rather poor.

81. POLYPODIUM CUSPIDATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:491. 1844, non D. Don, 1825. =**Thelypteris repanda** (Fée) Morton, comb. nov.

Phegopteris repanda Fée, Gen. Fil. 251. 1852. Type: Penang, *Gaudichaud* (Hb. Webb-FI, not seen).

Polypodium urophyllum Wallich, Num. List 299. 1829, nom. nud. Based on Penang, *Wallich* in 1822, Assam, *Wallich* in 1827, and a var. *angusta* (nom. nud.), Penang, *Wallich* in 1822.

Goniopteris dalhousiana Fée, Mém. Soc. Hist. Nat. Strasb. 5(1):92. 1857. Type: Penang, *Lady Dalhousie* (isotype K, not seen).

Phegopteris urophylla Mett. Abhandl. Senckenb. Naturf. Gesell. 2:310. 1858. Syntypes: Nepal, *Wallich;* Borneo, *Meissner;* plus an unnamed variety, Borneo, *Meissner.* The locality "Nepal" is surely an error (although perhaps not Mettenius' error if the specimen that he had was erroneously labeled); Mettenius' description (in the sporangia being setose, the pinnae caudate, etc.) shows that he had a specimen of *Wallich* 299 from Penang, for his description agrees with that, and there are no Wallich specimens of this species from Nepal, where the species is not known to occur. I designate the Wallich specimen of this species (presumably under no. 299) in Berlin as the lectotype, if one is there; isotypes are *Wallich* 299 in Brussels (Morton photographs 19744) and in the East India Company Herbarium, no. 299 (K, Morton photograph 15740). The Meissner specimen from Borneo is presumably *T. urophylla* var. *nitida* (Holttum) K. Iwatsuki, Acta Phytotax. Geobot. 22:94. 1966.[2]

Polypodium urophyllum (Mett.) Hook. Sp. Fil. 5:9. 1864. Hooker wrongly attributed the species to Wallich, but Wallich's name was a nomen nudum. Since the species was validly published only by Mettenius in 1858, long after Wallich's death, Wallich cannot reasonably be said to have transferred it in 1864. Hooker cited *Phegopteris urophylla* Mett., but also some other synonyms erroneously, such as *Polypodium asperum* K. B. Presl.

Polypodium pinwillii Baker, Ann. Bot. 5:460. 1891. Type: Malacca, *Pinwill* (K, not seen).

Abacopteris urophylla (Mett.) Ching, Bull. Fan Mem. Inst. Biol. Bot. 8:251. 1938 (Ching cited the parenthetical author wrongly as "Wall.").

Thelypteris urophylla (Mett.) K. Iwatsuki, Southeast Asian Studies 3(3):81. 1965 (parenthetical author wrongly cited as "Wall. ex Hook.").

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[2] *Thelypteris urophylla* var. *nitida* (Holttum) K. Iwatsuki was first proposed in Acta Phytotax. Geobot. 21:171. August, 1965, but the specific combination *T. urophylla* was not made until December, 1965; it is not possible to make a legitimate varietal combination in advance of the valid publication of its species combination.

Pronephrium repandum (Fée) Holttum, Blumea 20:109. 1972.

LECTOTYPE: Two Roxburgh specimens in the Brussels Herbarium, evidently a part of the same collection, the sheet with the apex with the name in the hand of Roxburgh and the date July 4, 1802 (Morton photographs 19742, 19743). According to Roxburgh, the species was collected in Pinang, i.e., Penang Island, Malaya, presumably by W. Roxburgh, Jr. Isotypes are in Geneva, indicated as from Prince of Wales Island, i.e., Penang Island (Morton photograph 16943) and in the East India Company Herbarium, no. 299-4 (K, Morton photograph 15739).

The reference given in the original description to *Polypodium urophyllum* Wall. Cat. 64, no. 299, was added by Griffith and was intended to indicate that *P. cuspidatum* Roxburgh was represented in the Wallich Herbarium by no. 299, more correctly 299-4 (as indicated by the page reference "64"), and not that Roxburgh's species was based on a Wallich collection; this would be impossible, since the Wallich collection of this species was made in 1822, many years after Roxburgh's death.

As indicated in the synonymy, most authors have wrongly attributed the epithet to "Wallich ex Hook.," but the first valid publication was by Mettenius, who must be cited as the author; Wallich's name will disappear in this connection, since his original *urophyllum* was a nomen nudum under *Polypodium*, and when it was first published by Mettenius it appeared under a different generic name, *Phegopteris*.

82. POLYPODIUM DICHOTOMUM sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:493. 1844, non Houtt., 1783, non Thunb., 1784. =**Dicranopteris linearis** var. **montana** Holttum, Reinwardtia 4:276. 1957.

AUTHENTIC MATERIAL: A Roxburgh specimen in the Brussels Herbarium with the name in Roxburgh's hand (Morton photograph 19939). There is a Roxburgh drawing in the British Museum that represents the same plant rather well; it is indicated as being from Amboina.

According to Roxburgh, his plant came from the Molucca Islands. Holttum records var. *montana* from the Moluccas, but only from Ternate, where Roxburgh's plant may have been collected by Christopher Smith; however, it could very well grow also in Amboina. The specimen cited above agrees well with a plant from the Admiralty Islands identified as var. *montana* by Holttum. Roxburgh did not consider his plant as new but referred it to *P. dichotomum* Thunb. *Acrostichum furcatum* L. is added as a synonym, but whether by Roxburgh or by Griffith is uncertain; my guess is that Griffith added it and inserted it in the wrong place, intending to put it as a synonym of *P. furcatum* Roxburgh, assuming that Roxburgh's species was the same as the Linnaean one from having the same specific epithet; however, he was

wrong about that, for the Linnaean species is a quite different plant of the West Indies.

83. POLYPODIUM DUBIUM Roxburgh, Calcutta Journ. Nat. Hist. 4:496. 1844. =**Microlepia dubia** (Roxburgh) Morton, comb. nov.

Davallia polypodioides sensu D. Don. Prodr. Fl. Nepal. 10. 1825, as to description not type. In Sledge's treatment of *Microlepia*, *D. polypodioides* is listed and discussed as though it were a new species; however, Don clearly was making a new combination, based on his cited synonym *Dicksonia polypodioides* Swartz, and remarked that the reason for considering it a *Davallia* rather than a *Dicksonia* was because of the one-valved involucre. However, Don evidently misidentified *D. polypodioides* Swartz, for a specimen that is authentic for Don's concept is in the British Museum (Nepal, *Wallich*, Morton photograph 6896), and this does not represent *Dicksonia polypodioides* Swartz, but rather the species later described as *Polypodium dubium* Roxburgh and *Microlepia firma* Mett.

Davallia roxburghii Wallich, Num. List. 2218. 1830, nom. nud. Based on a Roxburgh specimen received as "*Pol. dub.* vel *Cyathea.*" Wallich evidently mistook the "*Pol. dub.*" to mean merely a dubious species of *Polypodium*, but as shown by his use of the name and his description Roxburgh intended it as a specific epithet, his *Polypodium dubium* (Morton photograph 15743).

Microlepia firma Mett. ex Kuhn, Linnaea 36:146. 1869. Syntypes: Mishmee, *Griffith* (K, Morton photograph 20646) and Bhoton, *Griffith* (K, Morton photograph 20645). I designate the latter as lectotype. There is a Griffith collection from Mishmee in the British Museum which is presumably an isosyntype.

LECTOTYPE: East India Company Herbarium no. 2218 (K, Morton photograph 15743), collected by Roxburgh. Roxburgh indicated his plant came from the Molucca Islands, where it was surely collected by Christopher Smith. There is a specimen at Kew in the Hooker Herbarium from Amboina, *Webb*, which matches the lectotype *Wallich* 2218 exactly. Webb was never in Amboina, and so the specimen was merely sent by Webb to Hooker; similar specimens from Amboina sent by Webb were collected by Christopher Smith. This indicates that the type of *Polypodium dubium* came from Amboina. There is in Geneva a specimen from Amboina collected by Christopher Smith that is unidentified except for the name "*Trichomanes*" written in, not by Roxburgh, which seems to match the lectotype chosen above and which is undoubtedly another isotype (Morton photograph 6551).

In his most useful paper on *Microlepia* (Kew Bull. 1956:523–531), Sledge clearly delimited three species that were much confused in herbaria—*M. speluncae*, *M. trapeziformis*, and *M. firma*. He cited *Davallia roxburghii* Wall. as a synonym of *M. firma*, not adopting this name because it is a nomen nudum as published by Wallich and not realizing that *Polypodium dubium* Roxburgh was based on the same material. A variety of this species follows:

84. **Microlepia dubia** (Roxburgh) Morton var. **subglabra** (Sledge) Morton, comb. nov.
Microlepia firma var. *subglabra* Sledge, Kew Bull. 1956:527. Type: Ceylon, *Thwaites* C. P. 3272 (K, Morton photograph 20644, not annotated by Sledge).

Microlepia firma var. *hirta* (Clarke) Sledge (Kew Bull. 1956: 527. 1956) was published as though *Davallia polypodioides* var. *hirta* was a new variety. It was not, however, but was based on the Hooker and Baker reference cited, on *Davallia hirta* Kaulf., which is from the Hawaiian Islands. Although it was not Sledge's intention, his var. *hirta* applies to the plants of the Hawaiian Islands, which are different from those of Sikkim and Bhotan.

85. POLYPODIUM ELATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:495. 1844. =**Pleocnemia leuzeana** (Gaud.) K. B. Presl, Tent. Pterid. 184, *t. 7, f. 12.* 1836 (as "*leuceana*").
Polypodium leuzeanum Gaud. *in* Freyc. Voy. Bot. 361, *t. 6.* 1827. Type: Pisang, Molucca Islands, *Gaudichaud.*
Aspidium leuzeanum (Gaud.) Kunze, Bot. Zeit. 4:474. 1846.
Tectaria leuzeana (Gaud.) Copel. Phil. Journ. Sci. 2C:417. 1907.
LECTOTYPE: A Roxburgh collection from Amboina in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photographs 5189, 19806). A second sheet in Brussels is very likely a lower pinna from the same collection; it is marked as *Polypodium elatum* herb. Roxb. Amboyna, 1796. Roxb., but not in Roxburgh's hand (Morton photographs 5190, 19805). A duplicate, very likely the apical part of the same frond, is in Geneva marked as "Amboyna, Dr. Roxburgh" (Morton photograph 16754). Another duplicate, surely a part of the same collection, is in the British Museum, collected in Amboina by Christopher Smith (Morton photograph 19529).

In the "Index Filicum," *Polypodium elatum* is left as a dubious species. The lectotype was identified by Baker as *Nephrodium giganteum*, a somewhat confused name. In recognizing *Pleocnemia* as a genus distinct from *Tectaria*, I am following Holttum (Reinwardtia 1:171–189. 1951), although with some reservations until the delimitation of *Tectaria* is better understood.

86. POLYPODIUM EXCAVATUM Roxburgh, Hortus Bengalensis 75. 1814; Calcutta Journ. Nat. Hist. 4:485, *t. 30* right (wrongly labeled "*P. quercifolium*") 1844, non Bory ex Willd., 1810. =**Polypodium scolopendria** Burm. f. Fl. Ind. 232. 1768.
Polypodium phymatodes L. Mant. 306. 1771.
TYPE: This presents a unique problem. Some of Roxburgh's species were listed in his "Hortus Bengalensis" (1814) in advance of their intended publication in his "Flora Indica." There was probably no intention of publishing new species here, but some of them have to be considered valid by reason of the citation references to Rheede's "Hortus Indicus Malabaricus," Rumphius' "Herbarium Amboinense," or other pre-Linnaean publications. The

only fern published by reference to Rumphius is this one, for which Rumphius vol. 6, *t. 35, f. 1* is cited. If this is taken at face value, *Polypodium excavatum* Roxburgh would become a synonym of *Stenosemia aurita* (Swartz) K. B. Presl, which this plate of Rumphius' represents. However, when Roxburgh's full manuscript was published, this reference was corrected to *t. 35, f. 2,* which represents *Polypodium scolopendria* Burm. f. That this was Roxburgh's real intent is shown by his description and published and unpublished drawings, as well as by two authentic specimens in the Brussels Herbarium named *excavatum* in Roxburgh's hand, for the description, the drawings, and the specimens all represent *P. scolopendria,* and are nothing like *Stenosemia aurita.* Therefore, common sense requires that we regard the original citation of "*f. 1*" as a typographical error for "*f. 2.*" This means that the type of Roxburgh's species must be considered to be Rumphius' description and illustration of his *Polypodium indicum minus* Herb. Amboin. 6:80, *t. 35, f. 2.* According to E. D. Merrill's "An Interpretation of Rumphius' Herbarium Amboinense," this description and plate clearly apply to *Polypodium phymatodes* L., now correctly known as *P. scolopendria.*

Roxburgh's description indicates that he had two forms in hand, one with a nearly simple blade and one with deeply pinnatifid blades. The two authentic Roxburgh specimens in Brussels named by Roxburgh illustrate these forms. One (Morton photograph 19926) has a simple blade just slightly lobed; the other (Morton photograph 19927) has a deeply pinnatifid blade typical of mature specimens of *P. scolopendria.* This kind of variation is well known in this species. According to Roxburgh's "Hortus Bengalensis," his material came from the Moluccas, collected by Christopher Smith; it was cultivated in the Calcutta Botanical Garden.

In the "Index Filicum," *P. excavatum* Roxburgh is referred to *P. longissium* Blume without question, but the basis of this opinion, which is an obvious error, is not known.

Copies of Roxburgh's original drawing are at Kew (no. 1747, Morton photograph 15868) and the British Museum (Morton photograph 15779). These drawings agree closely with the published drawing *t. 30,* right, which is erroneously labeled *Polypodium quercifolium,* doubtless by the editor, Griffith. The true *P. quercifolium* was not illustrated by Roxburgh, so far as I know.

87. POLYPODIUM FELINUM Roxburgh, Calcutta Journ. Nat. Hist. 4:496. 1844.
=Cyathea felinum (Roxburgh) Morton, comb. nov.
Alsophila concinna Baker *in* Hook. & Bak. Syn. Fil., ed. 2, 439. 1874. Type: Louisiade Archipelago, MacGillivray.
Alsophila polyphlebia Baker, Journ. Linn. Soc. Bot. 15:104. 1876. Type: Aru Island, Molucca Islands, *Mosley.*
Alsophila sangirensis Christ *in* Warburg, Monsunia 1:90. 1900. Type: Sangihe Island, Molucca Islands, *Warburg* 16605.

Cyathea sangirensis (Christ) Copel. Phil. Journ. Sci. 4C:37. 1909.

LECTOTYPE: Amboina, *Roxburgh* (G, Morton photographs 6546, 16633). A duplicate closely agreeing and evidently a part of the same collection is in Brussels, with the name in Roxburgh's hand (Morton photograph 19858). Specimens that also agree, doubtless isotypes, are in the J. E. Smith Herbarium, Nos. 1625-74 and 1625-75 (LINN, Morton photographs 20226, 20227); they were collected in Amboina by Christopher Smith in 1797. Roxburgh cited the locality as Moluccas and Pullo Pinang; I have not located any specimens from Penang, which would be different, since this species is not known in Penang.

Cyathea sangirensis of Holttum's treatment in the "Flora Malesiana" is a rather characteristic species because of its large size and strongly toothed segments. Nevertheless, it has been repeatedly renamed, for in addition to the synonyms quoted above, Holttum lists seven additional specific synonyms. Apparently, this is one of the common species of the Moluccas. I have seen authentic specimens or photographs of many of these synonyms, and it appears that Holttum is correct in placing them all under a single species; the Roxburgh lectotype is quite in agreement with the other specimens. Roxburgh described his plant as being "scandent," which would be unusual in this species, but not impossible. At least a few species of *Cyathea* are said to be scandent, e.g., *C. biformis* (Rosenst.) Copel., which Holttum describes as "Stem 1–1⅕ cm. thick, climbing (clinging to supporting tree by its roots," and *C. scandens* (Brause) Domin is said to have a similar habit. However, Roxburgh may have been wrong about this; he did not know the plant in the field, since he never collected in Amboina, and probably not in Penang.

88. POLYPODIUM FERRUGINEUM Roxburgh, Calcutta Journ. Nat. Hist. 4:487. 1844, non Mart. & Gal., 1842. =?**Nephrolepis hirsutula** (Forst.) K. B. Presl, Tent. Pterid. 79. 1836. Type from the South Sea Islands, *Forster* (holotype or isotype BM, Morton photograph 6876); since this type specimen agrees altogether with plants from Tahiti, and since many of Forster's collections are known to have come from Tahiti, this may be presumed the type locality.

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in Roxburgh's hand. According to Roxburgh his species came from Amboina. There is an isotype from the Roxburgh Herbarium in Geneva, collected in Amboina by Christopher Smith (Morton photograph 6571). Another specimen that may be an isotype, although not named *P. ferrugineum*, is in the J. E. Smith Herbarium, no. 1622-104 in the Linnean Society (Morton photograph 20357).

I do not have the lectotype in hand or a photograph of it, but I did see it at Kew while it was on loan to Dr. Jarrett.

According to my notes made at the time, the pinnae are strongly rufescent-pilose, with very shallow lobes, the upper base rounded and not auriculate, the lower base very broad and rounded also; the midrib is scaly above. It has been identified as *Nephrolepis rufescens* (Schrad.) Wawra, which is considered in the "Index Filicum" as a synonym of *N. hirsutula*. Although most, but not all, specimens of *N. hirsutula* have the pinnae auriculate at the upper base, at least one collection from Amboina (*C. B. Robinson* 1957, US), identified as *N. hirsutula* by Merrill, agrees with the Roxburgh type.

89. POLYPODIUM FLAGELLIFERUM Roxburgh, Calcutta Journ. Nat. Hist. 4:487, *t. XXXI* (right hand). 1844. =**Nephrolepis biserrata** (Swartz) Schott, Gen. Fil. ad *t. 3*. 1834.

LECTOTYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19930a). According to Roxburgh the species is a native of Bengal, India. This type specimen was determined as *N. acuta* (Schkuhr) K. B. Presl by Baker, which is considered a synonym of *N. biserrata*.

A second specimen may be in the Brussels Herbarium, also with the name in Roxburgh's hand, for my notes indicate that one was on loan to Dr. Jarrett at Kew in 1969. It is the same as the one selected as lectotype. A painting at Kew (no. 1748) (Morton photograph 15869) agrees well enough, especially in the nearly medial sori, a characteristic of *N. biserrata*. In the "Index Filicum," *P. flagelliferum* is referred to *N. exaltata*, but this is clearly wrong from the position of the sori. The indusia are wrongly drawn in the painting as reniform; they are actually suborbicular with a narrow, closed sinus, as they should be in *N. biserrata*.

90. POLYPODIUM FURCATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:493. 1844, non Swartz, 1802, non Desv., 1827. =**Gleichenia truncata** (Willd.) Spreng. *in* L. Syst. Nat. ed. 16, 4:25. 1827.

Mertensia truncata Willd. Kongl. Vet. Akad. Nya Handl. 25:169, *t. V, f. A*. 1804. Type: B-Hb. Willd. no. 19470, received from Jussieu; an isotype ought to be in the Jussieu Herbarium in Paris.

Mertensia laevigata Willd. *in* L. Sp. Pl. ed. 4, 5:75. 1810.

Gleichenia laevigata (Willd.) Hook. Sp. Fil. 1:10. 1844.

Stichorus truncatus (Willd.) Nakai, Bull. Nat. Sci. Mus. Tokyo 29:20. 1950.

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in Roxburgh's hand on a ticket overlying a stem (Morton photograph 4743). An isotype, also with a label in Roxburgh's hand, is also in Brussels and is essentially identical (Morton photograph 4744). According to Roxburgh, the species was collected in Pullo Pinang, i.e., Penang Island, Malaya, where it was doubtless found by W. Roxburgh, Jr., or W. Hunter.

In the "Index Filicum," *P. furcatum* Roxburgh is referred with a query to *Gleichenia glauca* (Thunb.) Hook., which is by no means the same and which does not even belong in the same subgenus. In Holttum's treatment of *Gleichenia* in the "Flora Malesiana," *P. furcatum* is omitted as a synonym.

91. **POLYPODIUM GLABRUM** Roxburgh, Calcutta Journ. Nat. Hist. 4:482. 1844, non Burm. f., 1768. =**Polypodium polycarpon** Cav. Descr. 1:246. 1802. Type: *Née*, MA (not seen). Cavanilles ascribed the type to San Antonio, Ecuador, but this species does not grow in South America; many of Née's localities were mixed, and his plant doubtless came from either the Marianna Islands or the Philippine Islands, where Née did collect and where this species grows.

Acrostichum punctatum L. Sp. Pl. ed. 2, 1524. 1763.

Polypodium punctatum (L.) Swartz, Journ. Bot. Schrad. 1800(1):21. 1802, non Thunb., 1784.

Polypodium polycarpon Swartz, Journ. Bot. Schrad. 1800(1):21. 1802, non Cav., 1802. In the "Index Filicum," this is cited erroneously as "Cav.: Sw.," but Swartz did not mention Cavanilles in publishing this species, he chose the name independently. No specimens were cited, and so the species must be typified from Swartz' "Species Filicum," to which the account in Schrader's Journal was a preliminary. The "Synopsis," p. 227, cites Mauritius, *Groendal* and Java, *Thunberg*. A reference is added here to *Polypodium polycarpon* Cav. and no "Amer. merid.," but only with a query, showing definitely that Swartz had not based his species on that of Cavanilles. The Swartz name was cited as 1801 and was thought to be earlier, but Stafleu has shown that it was actually published in 1802, and so we can assume for convenience that the Cavanilles name is earlier, for it also was formerly cited as of 1801. The Swartz species must be lectotypified by either the Groendal or Thunberg specimens, and very likely the Groendal will be chosen, for it is probably in the Swartz Herbarium in Stockholm, and the Thunberg specimen is probably only in the Thunberg Herbarium. It has been generally assumed that the species is taxonomically the same as *P. polycarpon* Cav., but since they are from different geographic areas, they may not be identical.

Polypodium irioides Poir. *in* Lam. Enc. Méth. 5:513. 1804. Type: Ile de France [Mauritius], probably collected by Commerson (P-Herb. Lam., Morton photograph 2696).

Polypodium lingulatum Swartz, Syn. Fil. 30. 1806. A new name for *P. punctatum* (L.) Swartz, non Thunb.

Polypodium glabrum Roxburgh ex Wallich, Num. List. no. 281. 1829, nom. nud. Based on *Wallich* in 1826 from Amherst and Martaban, no. 281-1; *Herb. Roxburgh*, no. 281-2; and *Herb. Wright*, no. 281-3. The specimen from the Roxburgh Herbarium cited by Wallich is not in the East India Company Herbarium at present, and the reference was doubtless to the specimen then in the Roxburgh Herbarium in the India House, which is the same sheet that is in Brussels and cited as lectotype.

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19930). According to Roxburgh it was "found near Calcutta on the trunks of large old trees, etc. where there is much shade and humidity." The "etc." locality mentioned refers at least in part to a collection from Silhet, by M. R. Smith (ex Herb. Roxburgh, BM, Morton photograph 20887). Roxburgh drawings of *P. glabrum* are at Kew, no. 1006 (Morton photograph 15870) and the British Museum (Morton photograph 15780); they are stylized, but probably do represent *P. polycarpon*.

In most herbaria and books this species has continued to be called *Polypodium punctatum* (L.) Swartz, even though Swartz recognized that this name was an illegitimate later homonym and renamed it *P. lingulatum*. An older name, however, appears to be *P. polycarpon* Cav. (but see the note above on *P. polycarpon* Swartz, which might have priority and which seemingly refers to the same species). Under *Microsorium*, the epithet *punctatum* is correct.

92. POLYPODIUM IMPUBER Roxburgh, Calcutta Journ. Nat. Hist. 4:494. 1844. =**Cyathea alternans** (Hook.) K. B. Presl, Abhandl. K. Böhm. Gesell. Wiss. V, 5:347. 1848.

Polypodium alternans Wallich, Num. List. no. 329. 1829, nom. nud.

Hemitelia alternans Hook. Icon. Pl. 7:*t. 622*. 1844. Syntypes: Penang, *Wallich, Dalhousie*. In the "Flora Malesiana," Holttum indicates that the "type" is Wallich 329, but this was only one of two original syntypes; Holttum's designation of Wallich List. no. 329 as type must be considered as a lectotype, the natural choice but still a lectotype rather than a type.

LECTOTYPE: Amboina, *Roxburgh* (G, Morton photographs 6542, 16636), the apical part of a frond. The basal part of probably the same frond is in Brussels, with the name *P. impuber* in Roxburgh's hand (Morton photograph 19851). Although I usually choose the Brussels specimens as lectotypes, since they have the names in Roxburgh's own hand, I do not in this instance, since the Brussels specimen, consisting of basal pinnae only, is sterile, and the Geneva specimen is fertile. Roxburgh gave the locality as Amboina.

Cyathea alternans is a rather characteristic species by reason of its small, entire, glabrous, rounded pinnules, most of which, except the basal, are adnate. Holttum (Fl. Males. II, 1(2):145. 1965) suggests that it has the appearance of being a hybrid between *C. moluccana* R. Brown and either *C. squamulata* (Blume) Copel. or *C. ridleyi* (Baker) Copel., but this is not quite comprehensible since he considers *squamulata* and *ridleyi* to be synonyms. One of these suggested parents does grow in Amboina, *C. moluccana*, but *C. squamulata* is not reported from there, although it may well occur. Incidentally, Holttum cites the parenthetical authority for *C. alternans* as "Wall. ex Hook.,"

but this may not be, for Wallich used the epithet *alternans* under *Polypodium* (as a nomen nudum), but the first valid publication was under the generic name *Hemitelia* by Hooker, and therefore Wallich's name disappears as an authority. The synonym *P. impuber* was overlooked by Holttum, although it was cited as a synonym of *C. alternans* in the "Index Filicum," Suppl. 1:124. 1913.

93. POLYPODIUM INVOLUCRATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:491. 1844. =**Tectaria crenata** Cav. Descr. 250. 1802. Type: Marianna Islands, *Née* (presumably MA).

Aspidium pachyphyllum Kunze, Bot. Zeit. 6:259. 1848. Lectotype: Java, *Zollinger* 580z (the fertile specimen, L, Morton photograph 2296). Since Kunze's herbarium is destroyed, it is necessary to designate lectotypes for his species; the present specimen is suitable, since it is marked "*Aspidium pachyphyllum* Kze n. sp." in Kunze's own hand; this may indeed be a holotype and there may never have been a collection in Kunze's own herbarium. There is a second sheet in Leiden of the same number also with the name in Kunze's hand, and it is undoubtedly a sterile part of the lectotype chosen above (Morton photograph 2294).

LECTOTYPE: A specimen of the Roxburgh herbarium in the Brussels Herbarium with the name in Roxburgh's hand; this specimen has a ticket in the hand of Christopher Smith reading "Amboyna, no. 333, 96," the "96" referring to the date 1796 (Morton photograph 5109, 19788). A duplicate of this collection is in Geneva with the data "Amboina, Dr. Roxburgh" (Morton photograph 16746). There is a specimen in the British Museum of this species collected in Ternate by Christopher Smith (Morton photograph 19528), and this may be a part of the type collection and the correct locality, since Roxburgh may have wrongly assumed that all of the Smith collections came from Amboina, as indeed most of them did, but perhaps this one did not.

In the "Index Filicum," *P. involucratum* is listed as a dubious species of *Dryopteris*. The brief original description is entirely consistent with the type cited above and not with any *Dryopteris* known from the Molucca Islands.

94. POLYPODIUM LONGIFOLIUM Roxburgh, Calcutta Journ. Nat. Hist. 4:492. 1844, non Cav., 1802, non Presl, 1822. =**Thelypteris heterocarpa** (Blume) Morton, Amer. Fern Journ. 49:113. 1959.

Aspidium heterocarpon Blume, Enum. Pl. Jav. 2:155. 1828. Syntypes: Two Blume collections in Leiden; the one of these from Java with the name in Blume's hand I designate as lectotype (Morton photograph 2556), since it is a fine specimen with two complete plants with rootstocks. The other specimen from Boerengrang, Java, also with the name in Blume's hand (Morton photograph 1152) is a larger plant with a much longer stipe and fewer reduced basal pinnae; it lacks a rootstock.

Dryopteris heterocarpa (Blume) Kuntze, Rev. Gen. Pl. 2:813. 1891.
Cyclosorus heterocarpus (Blume) Ching, Bull. Fan Mem. Inst. Biol. Bot. 8:180. 1938.

LECTOTYPE: Two Roxburgh collections in the Brussels Herbarium, both evidently a part of the same frond, one with the name in the hand of Roxburgh (Morton photographs 19683, 19684). The locality is given as Amboina by Roxburgh. An isotype in Geneva bears the data "Amboyna, Dr. Roxburgh" and a label "Typus" (Morton photographs 6541, 16660).

I do not know that *T. heterocarpa* has been previously reported from Amboina, but there is no reason why it should not be there, for the species ranges as far east as New Guinea and the Bismarck Archipelago. It is rather easily recognizable among its numerous relatives by the large, glabrous, very persistent, vaulted indusia.

95. POLYPODIUM LUCIDUM Roxburgh, Calcutta Journ. Nat. Hist. 4:486. 1844.
=**Polypodium cuspidatum** D. Don, Prodr. Fl. Nepal 2. Feb. 1, 1825. Neotype: Nepal, *Wallich* in 1818 (BM, Morton photograph 20885). This might be the holotype, but does not bear the name in Don's hand.
Polypodium leiorhizum Wallich, Num. List. no. 303. 1829, nom. nud. Based on three collections: Nepal, *Wallich* in 1820, Kumaon, *R. Blinkworth*, and Sylhet Mountains, *DeSilva*.
Phymatodes leiorhiza K. B. Presl, Tent. Pterid. 196. 1836, nom. nud.
Drynaria leiorhiza J. Smith, Journ. Bot. Hook. 4:61. 1841, nom. nud.
Polypodium leiorhizum Wallich ex Mett. Fil. Hort. Bot. Lips. 39, *t. 25, f. 7.* May–June, 1856. Not formally described, but with sufficient description of sorus and venation plus the figure to validate the name. Fully described by Mettenius, Abhandl. Senckenb. Naturf. Gesell. 2:103. Oct., 1856. Also published in Hook. Fil. Exot. *t. 24.* 1857. Type: Nepal, *Wallich* (presumably B).
Phymatodes cuspidata (D. Don) J. Smith, Cat. Cult. Ferns 10. 1857.
Pleopeltis leiorhizon (Wallich ex Mett.) Moore, Ind. Fil. 346. 1862.
Phymatodes lucida (Roxburgh) Ching, Contr. Inst. Bot. Nat. Acad. Peiping 2:61. 1933. The type is wrongly stated to be Nepal, *Wallich*.
Microsorium lucidum (Roxburgh) Copel. Gen. Fil. 196. 1947.
Microsorium cuspidatum (D. Don) Tagawa, Fl. Eastern Himalaya 495. 1966.

TYPE: No herbarium specimens from Roxburgh of this species have been located. Therefore, a Roxburgh drawing at Kew, no. 1922 (Morton photograph 15871), is designated lectotype temporarily until a specimen can be located. The plant, according to Roxburgh, is a "Native of Nepaul, from thence introduced into the Botanic Garden [at Calcutta] by Dr. Buchanan in 1802." Roxburgh's description, which is rather full, was probably drawn up from living plants and no herbarium specimens may have been made.

I have given the synonymy in full, since this species is currently being filed under three specific epithets—*lucidum, leio-*

rhizum, and *cuspidatum*. *Polypodium cuspidatum* D. Don is clearly the earliest of these, but it was rejected in the "Index Filicum" in the belief that *Polypodium cuspidatum* K. B. Presl, Rel. Haenk. 1:20, *t. 1, f. 3*. 1825, had priority. However, from Stafleu's recent "Taxonomic Literature" it appears that Don's work was published Feb. 1, 1825, and Presl's between June and November 1825. This is another instance showing the importance of careful dating.

96. POLYPODIUM MUCRONATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:490. 1844, non Swartz, 1806. =**Polystichum** sp.

TYPE: No authentic specimens seen. The species was described from plants collected in Sylhet (East Pakistan) by M. R. Smith in 1811 (Hort. Bengal. 75. 1814) and introduced in the Calcutta Botanical Garden in 1811 according to Voigt (Hort. Suburb. Calcut. 734. 1845).

The description is of a plant with simply pinnate fronds, with ensiform, acutely serrate, acuminate pinnae; the texture is hard and glossy, and the serrations very acute, i.e., mucronate as in the specific epithet chosen. This description indicates that the species is a *Polystichum*. It is possible that no herbarium specimens were ever made. By knowing which species of *Polystichum* grow in Sylhet, one could guess which species is meant. The matter is not of importance since Roxburgh's name is an illegitimate later homonym.

97. POLYPODIUM MULTIFLORUM Roxburgh, Calcutta Journ. Nat. Hist. 4:493. 1844, non Roth, 1797. =**Arcypteris irregularis** (K. B. Presl) Holttum, Reinwardtia 1:193. 1951.

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in Roxburgh's hand and the identification *Aspidium difforme* Blume by Baker (Morton photographs 5184, 19804). Two other specimens, surely isotypes, are also in Brussels and likely represent different parts of the same frond, a base and an apex (Morton photographs 5185, 5186, 19802). The species was collected in Amboina, according to Roxburgh, where it was doubtless obtained by Christopher Smith. Two isotypes are in Geneva, one labeled "Ind. orient., Dr. Roxburgh" (Morton photograph 6565) and one "Amboina, Dr. Roxburgh" (Morton photograph 16755).

For synonymy and comments on the genus *Arcypteris* see under *Polypodium confertum*. Roxburgh's descriptions of his *P. confertum* and *P. multiflorum* are almost identical; he may have been influenced by the geography—one came from India and one from the Molucca Islands—but this species has a broad range and occurs in both places in apparently indistinguishable forms. In the "Index Filicum," *P. multiflorum* Roxburgh is left as a dubious species.

98. POLYPODIUM NUDATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:491. 1844. =**Thelypteris nudata** (Roxburgh) Morton, comb. nov.

Polypodium multilineatum Wall. ex. Hook. Sp. Fil. 5:11. 1863. Type: *Wallich* (K not seen).

Nephrodium moulmeinense Bedd. Ferns Brit. Ind. Suppl. 18. 1876. Type: Sylhet, *Wallich* 147 (K not seen).

Thelypteris multilineata (Wall. ex Hook.) Morton, Amer. Fern Journ. 49:113. 1959.

Pronephrium nudatum (Roxburgh) Holttum, Blumea 29:111. 1972.

TYPE: Two Roxburgh specimens in the Brussels Herbarium, evidently a part of the same frond, the apical part with the name in Roxburgh's hand and the number 2395 (Morton photographs 19688, 19689). Since this is the only specimen found in any herbarium, it is presumably a holotype. According to Roxburgh, it is from Amboina, but this is surely an error. There is in the British Museum a specimen of the Roxburgh Herbarium—not named *nudatum*, however—that is *multilineata* and which agrees with the Roxburgh type of *nudatum*. It was collected in Sylhet by M. R. Smith (Morton photograph 20854). Presumably, Roxburgh had his material (doubtless unmounted at the time) in a cover with the name "Smith" on it, and since he had so many specimens from Amboina collected by Christopher Smith, he erroneously assumed that this one also was from Christopher Smith, rather than M. R. Smith. Therefore, the species is from Sylhet, and not from Amboina.

99. POLYPODIUM PARASITICUM sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:507. 1844. =**Thelypteris dentata** (Forsk.) E. St. John, Amer. Fern Journ. 26:44. 1936, sensu lato.

Polypodium dentatum Forst. Fl. Aegypt.-Arab. 185. 1775.

AUTHENTIC MATERIAL: Amboina, *Christopher Smith* 310, collected in 1796, with the name in Roxburgh's hand (BR, Morton photograph 19783). An apparent duplicate of this and probably the basal part of the same collection is also in Brussels,[3] identified by Baker as *Nephrodium molle* var. *glabratum* (Morton photograph 19702). Roxburgh stated: "Nat. of various parts of India. The above definition is taken from Molucca plants."

Roxburgh did not attribute this species to Linnaeus, and Linnaeus was not mentioned. Griffith added "*Aspidium parasiticum*, Hb. Madras, Wall. Cat. 67, No. 2239?," but this is not equivalent to citing *Polypodium parasiticum* L. as a synonym, for it is only a reference to a particular sheet mentioned in the Wallich "Numerical List" on page 67, and this only with a query, which may not have anything to do with the Linnaean species and is surely not a type. Nevertheless, it seems reasonable that Roxburgh really did consider his plant the same as that of Linnaeus. The specific name could hardly have been chosen

[3] It was the custom in the Roxburgh Herbarium not to transfer data to the second sheets, but to pin the sheets together. When they are not fastened, it is not usually difficult to match them, as quite often the second sheet is clearly the base or apex of the frond on the first sheet.

independently by Roxburgh, for it is peculiar in that it is so inappropriate; "parasitic" in the old days usually meant epiphytic, but this species is always terrestrial.

It is evident that Roxburgh had several collections in hand that he called *P. parasiticum,* which probably came from different places since they are not identical with each other. A collection named *parasiticum* by Roxburgh in Brussels (Morton photograph 19701) is probably correctly named, but it is a young frond with only immature indusia and sporangia; a probable duplicate is also in Brussels (Morton photograph 19700), determined as *Nephrodium molle* and with the indication "Ind. or. Hb. Roxb." These two specimens might be *T. contigua* (Rosenst.) Reed, according to Holttum. They do have smaller and narrower pinnae. In that case, they are doubtless from Penang. Another Roxburgh collection in Brussels has a label in Roxburgh's hand reading "Seems to differ too little from *P. parasiticum* to form a distinct species"; Roxburgh was probably right, for the specimen seems to be only a rather large, glabrate form; there is an apparent duplicate of this, without data, also in Brussels (Morton photograph 19674). These Holttum has identified as *Cyclosorus vestigiatus* (Copel.) Copel., with sessile, spherical glands. Another collection, perhaps slightly different, is represented by two sheets in Brussels, both identified as *Nephrodium molle,* with the indication "Ind. or., Roxburgh" (Morton photographs 19698, 19699); a similar specimen is in the British Museum, indicated as collected in the Moluccas by Christopher Smith (Morton photograph 20971). Some specimens that Roxburgh identified as *Polypodium sophoroides* appear to be rather *T. dentata* with only the basal veinlets fertile; these are in Geneva, from the Molucca Islands (Morton photographs 6561, 16661); a duplicate is in the British Museum, from Gilolo Island, *Christopher Smith,* November, 1801 (Morton photograph 20870). See my comment under *Polypodium sophoroides* sensu Roxburgh.

100. **Polypodium pertusum** Roxburgh ex Hook. Exot. Fl. 2:*t. 162*. 1825; Roxburgh, Calcutta Journ. Nat. Hist. 4:483, *t. 29* (left). 1844. =**Pyrrosia lanceolata** (L.) Farwell, Amer. Midl. Nat. 12:245. 1931.

Acrostichum lanceolatum L. Sp. Pl. 1067. 1753. Lectotype: Chosen inferentially by Trimen (Journ. Linn. Soc. Bot. 24:152. 1886) as Ceylon, *Hermann* 380 (BM). Trimen considered this species erroneously to be the same as *Polypodium adnascens* Swartz, a somewhat similar species which, however, does not occur in Ceylon. According to a note by Alston quoted by Ching (Bull. Chin. Bot. Soc. 1:46. 1935) the lectotype of *A. lanceolatum* in the Hermann Herbarium matches *Polypodium*

spissum Bory ex Willd. better than Indian specimens that Ching referred to *P. adnascens.*

Niphobolus pertusus (Roxb. ex Hook.) Spreng. Syst. Veg. ed. 16., 4:44. 1827.

Cyclophorus lanceolatus (L.) Alston, Journ. Bot. Brit. & For. 69:102. 1931 (excl. syn).

TYPE: Hooker described *P. pertusum* Roxburgh from a Roxburgh specimen from the Delta of the Ganges transmitted to him by Wallich and from a plant cultivated in the Liverpool Botantical Garden from material received from the Royal Horticultural Society. The Roxburgh specimen that Hooker had in hand when he adopted Roxburgh's name was not found at the British Museum (Natural History) or in the Hooker Herbarium at Kew. A duplicate is in Brussels with the name in the hand of Roxburgh (Morton photograph 19936). Another duplicate is in the East India Company Herbarium, no. 267-5 (K, upper right, the other specimens on the sheet are Herb. Wight; Morton photograph 15735). An authentic Roxburgh drawing is at Kew, no. 1745 (Morton photograph 15872). The other specimen cited by Hooker, the one cultivated in Liverpool, was said to have come from China, and according to Ching represents *Pyrrosia adnascens;* I have not seen it and probably neither did Ching.

Ching (Bull. Chin. Bot. Soc. 1:71. 1935) indicates that *P. lanceolata* is a common fern in "the whole of tropical Asia," and also cites Polynesia, but not the Mascarene Islands. He equates it with *Polypodium spissum* Bory ex Willd. and states that the type of that species came from "Insula Borbourn (or Malabar)," but this represents a misunderstanding. The type came from Bourbon, which is the present island of Réunion in the Mascarene Islands and not from Malabar in India. Whether *P. spissum* is really the same as the true *P. lanceolata* from Ceylon can be determined only from an examination of the type in the Willdenow Herbarium in Berlin, where it is mounted on two sheets under the number 19627.

101. POLYPODIUM PHYLLITIDIS Roxburgh, Calcutta Journ. Nat. Hist. 4:483. 1844, non L., 1753. =**Polypodium phyllomanes** Christ, Bull. Acad. Géogr. Bot. Le Mans 1902:210, figs. 1902.

Neocheiropteris phyllomanes (Christ) Ching, Bull. Fan Mem. Inst. Biol. 4:110. 1933.

Neolepisorus phyllomanes (Christ) Ching, Bull. Fan Mem. Inst. Biol. 10:14. 1940 (reference not seen).

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with a label reading "*Polypodium* an *phyllitidis*, Feb. 2, Journ. p. 185" not in Roxburgh's hand, and a later annotation label "*Nephrodium* (*Sagenia*) *singaporianum* Baker," the right-hand specimen (Morton photograph 19810). According to Roxburgh his species was collected near Chittagong [East Pakistan] by Buchanan-Hamilton (Hort. Bengal. 75. 1814).

In the "Index Filicum," *P. phyllitidis* Roxburgh (non L.) is referred to *Aspidium singaporianum* Wallich ex Hook. & Grev.

with a query. This is based on the entry added to the original description by the editor, Griffith, reading: "*Aspidium Singaporianum* Wall. Cat. P. 64, No. 374?" Griffith may have been partly right, for the left-hand specimen on the sheet designated above as lectotype is actually *Tectaria singaporiana* (Wallich ex Hook. & Grev.) Copel. However, that this specimen was not Roxburgh's type is shown by the fact that *T. singaporiana*—a very distinct species of *Tectaria* by reason of its simple blade resembling that of a *Polypodium*—is known only from the Malay Peninsula (Thailand, Malaya, and Singapore) and from not near Chittagong where Roxburgh's plant came from. The fact that Roxburgh has a real *Polypodium* and not a *Tectaria* is also indicated by his statement "involucres obscure," which would indicate that he saw no indusia; the indusia in *Tectaria singaporiana* are conspicuous and persistent. The right-hand plant on the sheet mentioned above is a *Polypodium* and it agrees with Roxburgh's description, so far as that goes, which is not very far. It appears to me from my photograph that this specimen can be referred to *P. phyllomanes* Christ as a form with a cuneate base, but it deserves further study. The venation of the *Tectaria* and the *Polypodium* are subtly different.

102. POLYPODIUM PHYMATODES sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:484. 1844, non L., 1771. =**Polypodium alternifolium** Willd. *in* L. Sp. Pl. ed. 4, 5:168. 1810.

AUTHENTIC MATERIAL: A Roxburgh specimen in Brussels identified as *Polypodium phymatodes* L. by Baker but without a name by Roxburgh (Morton photograph 19929). Roxburgh stated that his *P. phymatodes* was native in various parts of India. There is no proof that this specimen actually represents Roxburgh's concept of *P. phymatodes*, but the specimen agrees with Roxburgh's brief description and is likely the plant intended; it is one of the Indian plants generally identified as *P. phymatodes*.

In the "Index Filicum," *Polypodium alternifolium* Willd. is listed as a dubious species, said probably to equal *P. longissimum* Blume or *P. nigrescens* Blume. Since *P. alternifolium* has priority, it would displace one of these well-known names, but an examination of photographs of the type in the Willdenow Herbarium kindly supplied by Dr. D. E. Meyer shows that this species is neither of these species but is a close ally or possible synonym of *P. scolopendria* Burm. f. (*P. phymatodes* L.). The type is mounted on three sheets under the number 19637; it came from "India orientalis," and was collected by Klein. It differs from *P. scolopendria* in having narrower segments separated by broader sinuses. I have recently stated that *P. alternifolium* is the same as the recently described species *Phymatodes banerr-*

jiana Pal & Pal, but I am not quite sure; that has the sori generally in two rows on each side of the midribs and *P. alternifolium* seems to have but one row; further investigation is indicated. Pal and Pal point out a number of minute differences in their *Phymatodes banerjiana* that cannot be seen in the photograph of *Polypodium alternifolium*.

103. POLYPODIUM PILOSUM Roxburgh, Calcutta Journ. Nat. Hist. 4:492. 1844, non Schkuhr, 1806. =**Tectaria fuscipes** (Wallich ex Bedd.) C. Chr. Contr. U. S. Nat. Herb. 26:290. 1931.

Aspidium fuscipes Wallich, Num. List. no. 361. 1829, nom. nud. Based on a plant from Chappendang Mountain, Tenasserim, India, *Wallich* in 1827.

Aspidium fuscipes Wallich ex Bedd. Ferns Brit. Ind. Suppl. 15, *t. 366*. 1876. Syntypes: "Himalayas, Birma . . . The plant figured was collected by Mr. Clarke at Cachar, but I have it from various parts of North India, the Birma plant is of softer texture more pubescent and greener in color when dried, and the anastomosis not so copious." Although Beddome attributed the name to Wallich, it is not clear that he actually drew his description from the Wallich specimen that was the basis of Wallich's original unpublished name; on the other hand, Beddome's illustration was specifically based on a Clarke collection from Cachar, and this I designate as lectotype; it is presumably in either Kew or the British Museum.

Ctenitopsis fuscipes (Wallich ex Bedd.) C. Chr. ex Tardieu & C. Chr. Notul. Syst. 7:87. Oct. 1938. The same combination was later published by Ching (Bull. Fan Mem. Inst. Biol. Bot. 8:813. Nov. 1938).

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in Roxburgh's hand (Morton photograph 5196, 19798). There is an isotype agreeing in all ways in Geneva, marked as "Chittagong, Dr. Roxburgh," but not in Roxburgh's hand (Morton photograph 16749). According to Roxburgh, his plant came from "Chittagong, near the Burning Wells," now in East Pakistan.

Roxburgh's plant is a small one for this species and shows only a few of the dark scales on the stipe that are characteristic of this species. However, there is no doubt as to its identity. This is one of the species poorly described by Roxburgh, and in the absence of the authentic material cited above, it would be hard to identify.

104. POLYPODIUM PROLIFERUM (Retz.) Roxburgh ex Wallich, Num. List. 312. 1829, non Kaulf., 1824. =**Thelypteris prolifera** (Retz.) Reed, Phytologia 17:306. 1968.

Hemionitis prolifera Retz. Obs. Bot. 6:38. 1791.

Dryopteris prolifera (Retz.) C. Chr. Ind. Fil. 286. 1905.

Ampelopteris prolifera (Retz.) Copel. Gen. Fil. 144. 1947.

This is an instance of a name validly published in Wallich's "Numerical List," since a basionym is cited, a reference to *Hemionitis prolifera* Retz. The name was attributed to Roxburgh, but this was very likely a distortion of Roxburgh's intent, for when Roxburgh published the name *Polypodium proliferum*, he attributed the species only to himself and did not mention Retzius. The epithet "*proliferum*" is apt and evidently occurred independently to Retzius and Roxburgh.

105. POLYPODIUM PROLIFERUM Roxburgh, Calcutta Journ. Nat. Hist. 4:489, *t. 32*, left. 1844, non Kaulf., 1824, non Roxburgh ex Wallich, 1829.
=**Thelypteris prolifera** (Retz.) Reed, Phytologia 17:306. 1968.

TYPE: No herbarium specimens of this species have been located; therefore, the published plate is designated as lectotype temporarily until a specimen is found. A copy of the original plate is in Kew (no. 1007, Morton photograph 15873) identified as "*Polypodium radicans*," probably the name first chosen by Roxburgh and probably changed to *proliferum* because of the earlier *Polypodium radicans* Burmann f., which Roxburgh knew and treated on page 488 of the published paper. According to Roxburgh, his species is a "native of Bengal, and the more interior parts of India. Grows among brushwood, long grass, etc. in moist shady places about Calcutta; fructifies during the latter part of the rainy season." According to Voigt (Hort. Suburb. Calcut. 734. 1845), the species was native in Serampore (Bengal), the Khasia Mountains, Oude, and Nepal.

It is evident that Roxburgh knew this species well in the field, for he gives a rather detailed description. He indicates that the fronds may reach up to 12 feet long, which is longer than I have seen reported elsewhere, but which may indeed be possible. As mentioned under *P. proliferum* Roxburgh ex Wallich, Roxburgh intended his *P. proliferum* as a new species and not as a transfer of *Hemionitis prolifera*, as indicated by Wallich. The two species are taxonomically the same but have different types.

106. POLYPODIUM QUERCIFOLIUM sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:484 (excl. *t. 30*, left). 1844. =**Drynaria quercifolia** (L.) J. Smith, Journ. Bot. Hook. 3:398. 1841.

AUTHENTIC MATERIAL: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19911). Roxburgh drawings at Kew (no. 1100 and Morton photograph 15874) and BM (Morton photograph 15767). According to Roxburgh, the species grows in various parts of India.

Roxburgh did not mention *Polypodium quercifolium* L., but he did cite a Rheede illustration that was one of the original citations of Linnaeus. And Roxburgh did not put the "R" after the species name, which he generally did when he was describing a new species. Therefore, it seems that Roxburgh really intended

the Linnaean species and was not considering his plant as new. The published illustration labeled *P. quercifolium* has been wrongly labeled, presumably accidentally by Griffith; it represents *P. excavatum* Roxburgh and not *P. quercifolium*.

107. POLYPODIUM RADICANS sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:488. 1844. =**Nephrolepis radicans** (Burm. f.) Kuhn, Ann. Lugd. Bat. 4:285. 1869.

AUTHENTIC MATERIAL: "Ind. or.," *Roxburgh* (BR, Morton photograph 19917a); Malay Islands, *Roxburgh* (G, Morton photograph 6547). There is also a second specimen in Brussels with the name in Roxburgh's hand and the number 2390 (not photographed).

Roxburgh wrote "*P. radicans. Burm. Fl. In. 233, t. 66, f. 3.* is not unlike the sterile frond, and was most likely intended for the same plant," which shows that he had some doubt about the identity of his collection with Burmann's species. His specimens, however, are clearly the same as *Polypodium radicans* Burm. f., which is a characteristic species easily recognized by its scrambling habit and thick, elongate runners. Roxburgh gave his locality as "Malay Islands, etc." It may be that his plant came from Penang Island.

108. POLYPODIUM RUPESTRE Roxburgh, Calcutta Journ. Nat. Hist. 4:488. 1844, non R. Brown, 1810, non Blume, 1828. =**Polypodium taeniatum** Swartz, Journ. Bot. Schrad. 1800 (2):26. 1802. Type: Java, *Thunberg*. *Crypsinus taeniatus* (Swartz) Copel. Gen. Fil. 206. 1947.

TYPE: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh and the number 22 (Morton photograph 19931) is designated as lectotype. A second Roxburgh specimen in Brussels without the name in the hand of Roxburgh (Morton photograph 19932) has fewer and somewhat larger pinnae but is probably an isotype. According to Roxburgh the species was collected in Pinang [i.e., Penang Island, Malaya] on mossy shaded rocks of granite; it was doubtless collected by W. Roxburgh, Jr.

In the "Index Filicum," *P. rupestre* Roxburgh was stated to be "*Nephrolepis* sp." but this was a very bad guess on the part of Christensen. The authentic specimen above designated as lectotype is clearly a *Polypodium* [*Crypsinus*]; it was identified as *Polypodium palmatum* Blume; although it is near that species, it is referable rather to *P. taeniatum* Swartz, which differs in having the blade fully pinnate rather than deeply pinnatifid, according to Holttum (Ferns of Malaya 194–196. 1954).

109. POLYPODIUM SCABRUM Roxburgh, Calcutta Journ. Nat. Hist. 4:491. 1844, non Presl, 1822. =**Thelypteris ferox** (Blume) Tagawa & Iwat-

suki, Acta Phytotax. Geobot. 23:54. Aug. 1968. [Same combination made by Reed, Phytologia 17:276. Oct. 1968.]
Aspidium ferox Blume, Enum. Pl. Jav. 2:153. 1828.
Dryopteris ferox (Blume) Kuntze, Rev. Gen. Pl. 2:812. 1891.
Cyclosorus ferox (Blume) Ching, Bull. Fan Mem. Inst. Biol. Bot. 8:167. 1938.

LECTOTYPE: Two Roxburgh specimens in the Brussels Herbarium, evidently parts of the same frond, with a label in the hand of Christopher Smith reading "On the high mountains of Amboina, Nov. 1796, no. 319"; the second sheet does not have an original label (Morton photographs 19666, 19667). Isotypes are in Geneva, labeled "Ind. Orient. Dr. Roxburgh" (Morton photograph 16933) and the J. E. Smith Herbarium nos. 1625-68, 1625-69, and 1625-70, Linnean Society (Morton photographs 20220, 20221, 20222); these are indicated as having been collected in Amboina by Christopher Smith.

In the "Index Filicum," *P. scabrum* Roxburgh is correctly indicated as equivalent to *Dryopteris ferox*, one of the better known species of the sect. *Cyclosorus*, distinguished by its subarborescent habit, large size, glabrous pinnae, and especially by the abundant, dark, hairlike scales present on the stipes and rhachises.

110. POLYPODIUM SCARIOSUM Roxburgh, Calcutta Journ. Nat. Hist. 4:494. 1844. =**Polystichum scariosum** (Roxburgh) Morton, comb. nov.
Polystichum prolificans van Alderw. van Rosenb. Bull. Jard. Bot. Buitenzorg III, 2:170. 1920. Type: Deli, Bandar-baroe, Sumatra, 1200 m., June 16, 1918, *Lörzing* 5743 (isotype L, Morton photograph 2143).

LECTOTYPE: Two Roxburgh specimens in the Brussels Herbarium, the sheet with the rhizome and stipe base with the name in Roxburgh's hand, the other consisting of the balance of a complete frond (Morton photographs 19780, 19779). There is an isotype in Geneva, marked "Amboyna, Dr. Roxburgh" (Morton photographs 6563, 16642). Roxburgh gave the locality as Amboina.

Polypodium scariosum Roxburgh is clearly the same as *Polystichum prolificans*, which is fairly distinct among the numerous bipinnate Polystichums in the rounded, not at all mucronate or aristate, lobes on the distal margin of the pinnules, the fairly large pinnules, and the presence of a large bud on the lower side of the rhachis a short distance from the apex. This species must be rare. I have seen it only from Sumatra, Malaya, and from Amboina, but it may well grow elsewhere, since Polystichums have been little studied. However, this could be a case of a wrong locality, and the specimens could have come from Penang. This could be assumed if study of all Amboina collections does not reveal the species there.

111. POLYPODIUM SEMIPINNATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:486. 1844. =**Tectaria semipinnata** (Roxburgh) Morton (see no. 5. *Acrostichum semipinnatum*).

TYPE: Two Roxburgh specimens in the Brussels Herbarium, the sterile one with the name in Roxburgh's hand, the fertile one not (Morton photograph 5111). Since no other specimens have been found in any herbarium collected by Roxburgh and named *P. semipinnatum*, these are doubtless the holotype. They were probably collected by W. Roxburgh, Jr. A native of the Malay Islands according to Roxburgh, surely from Penang Island, since the specimen agrees with material from there and the species does not grow in the Moluccas, the other area that Roxburgh perhaps sometimes referred to as the "Malay Islands."

Roxburgh described the same species twice and with the same specific epithet, once as *Acrostichum semipinnatum* and once as *Polypodium semipinnatum*. This was intentional and not a lapse, for under *P. semipinnatum* Roxburgh remarked "is very like my *Acrostichum semipinnatum*." It is indeed so like that species that it cannot be distinguished even specifically, let alone generically.

112. POLYPODIUM SEMISAGITTATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:491. 1844. =**Thelypteris semisagittata** (Roxburgh) Morton, comb. nov.

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19645). A very similar specimen and surely a duplicate of the lectotype is in Geneva, marked "India Orient. Dr. Roxburgh" (Morton photographs 6562, 16932). According to Roxburgh, his species is a native of the Delta of the Ganges, Chittagong, etc. The lectotype likely came from Chittagong, where it may have been collected by Buchanan-Hamilton, since it agrees with specimens from there. The lectotype was identified by Baker as *Nephrodium arbuscula* Desv., but it can hardly be the true *Thelypteris arbuscula* (Willd.) K. Iwatsuki (Acta Phytotax. Geobot. 2:170. 1965), the type of which is from Mauritius, and it may occur also in Ceylon and southern India.

This species is distinct from, but apparently allied to, *T. papilio* (Hope) Iwatsuki, which is much larger, does not have semisagittate lower pinnae, and has the pinnae more deeply lobed than in *T. semisagittata*.

In the "Index Filicum," *Polypodium semisagittatum* Roxburgh was referred without a query to *Dryopteris arida* (D. Don) Kuntze, but this species does not agree with Roxburgh's description or specimens. Roxburgh's specimen resembles in general but is not identical with a specimen from Chittagong, March, 1880, *Gamble* 7827 (US), which was originally identified as *Nephrodium truncatum* Presl, reidentified as *Cyclosorus subpubescens* (Blume) Ching by Ching, and recently as *Cyclosorus*

latipinna (Hook.) Tardieu by Iwatsuki. This species can hardly be the same as *Cyclosorus subpubescens*, as delimited by Holttum, or *C. sumatranus*. It does not agree with *C. latipinna*, which was described from Hong Kong as *Nephrodium molle* var. *latipinna* Benth. (Flora Hong Kong 455. 1861), which does not have numerous reduced, butterfly-like lower pinnae. Apparently, no lectotype has ever been proposed for var. *latipinna*. There were four original syntypes: Hong Kong, *Champion, Harland, Hance;* Little Hong Kong, *Wilford;* of these, I choose Hong Kong, *Hance* 135 as lectotype (K, Morton photograph 20647), for it is the best developed of the syntypes. None of the syntypes was annotated by Bentham, nor by Hooker. Rather curiously, all the authors who have discussed this species, such as Tardieu, Holttum, and Ching, have cited Hooker as the author of the basionym, but the epithet *latipinna* originated with Bentham, and Hooker merely raised Bentham's variety to specific rank.

113. POLYPODIUM SOPHOROIDES sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:489. 1844, non Thunb., 1794. =**Thelypteris sumatrana** (v. A. v. R.) Reed and **T. dentata** (Forsk.) E. St. John, sensu lato, both pro parte.

AUTHENTIC MATERIAL: Two Roxburgh specimens with the name *sophoroides* in Roxburgh's hand. The frond on the right of the sheet labeled "Ind. or. Roxb." (BR, Morton photograph 19696) is *Thelypteris sumatrana*. The left-hand plant is the basal part of the plant with apex only on the other sheet (BR, Morton photograph 19697). This plant is *Thelypteris dentata*, s.l. It is hairier and has persistent indusia, and the superior segments of the basal pinnae are toothed. The specimen of *T. sumatrana* is glabrate, the indusia are smaller, and the basal segments are not toothed. According to Roxburgh, his material came from the "Moluccas, etc.," which is true of the specimen of *T. dentata*, s.l. The specimen of *T. sumatrana* is probably from Penang, for it matches a specimen in the British Museum (Natural History) marked as from "Princes Island, Dr. Banks" (Morton photograph 20869). This means that the specimen was sent to Dr. Banks, who never was in Penang, by Roxburgh, for only Roxburgh called Penang "Prince of Wales Island"; other earlier collectors called it "Pullo Pinang."

That Roxburgh's concept of *P. sophoroides* was confused is shown by his description of the sori as "sometimes in a single line on each side of the nerve; sometimes they form a nearly continued line near the margins of the incisures." The former condition is shown by the specimens, cited above as authentic, that represent *T. sumatrana*, and the same condition obtains in the true *Polypodium sophoroides* Thunb. By the second kind of sori Roxburgh intended to describe a condition where the sori are present only near the sinuses between the segments, i.e., that only the lowest pair, or the lowest two pairs perhaps, of veinlets are fertile; this condition is shown by specimens in Geneva

(Morton photographs 6561, 16661), one of them with the name *sophoroides* in Roxburgh's hand; these specimens are matched by one in the British Museum from Gilolo Island, Moluccas, collected by Christopher Smith in November, 1801; these specimens with only the lowest veinlets fertile do not represent *T. sumatrana*, but appear to be forms of *Thelypteris dentata*, s.l.

Roxburgh's identification of his Penang material as *Polypodium sophoroides* is not far wide of the mark, for his specimens do resemble that species, which, however, has a more northern range in Japan and China, and which differs in having most of the pinnae with a somewhat elongate superior basal segment and in having the basal pinnae not reduced, among other characters, especially of pubescence. *Polypodium sophoroides* Thunb. is a taxonomic synonym of *Thelypteris acuminata* (Houttuyn) Morton. Strangely, in the fourth supplement of the "Index Filicum," the authority for this species is given as *Thelypteris acuminata* (Panz. in Christm. & Panz.) Morton, with the basionym *Polypodium acuminatum* Panz. in Christm. & Panz. Pflanzensyst. 13(1):204, *t. 99, f. 2.* 1786, which is entirely wrong for both author, book, and date; the author is properly Houttuyn, and the citation of the basionym is *P. acuminatum* Houtt. Nat. Hist. II, 14:181, *t. 99, f. 2.* 1783, as given by Merrill (Journ. Arn. Arb. 19:313. 1938) and as I gave it (Amer. Fern Journ. 49:139. 1958 [1959]).

114. POLYPODIUM SQUARROSUM Roxburgh, Calcutta Journ. Nat. Hist. 4:494. 1844. =**Polystichum squarrosum** (D. Don) Fée, Gen. Fil. 287. 1852.
Aspidium squarrosum D. Don, Prodr. Fl. Nepal. 4. 1825. Type: Narainhetty, Nepal, Mar. 7, 1803, *Buchanan-Hamilton* (BM, Morton photograph 20886).

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in Roxburgh's hand (Morton photograph 19777). There is an isotype in Geneva, with the label "Mountains of Sirinagur, Capt. Hardwicke "(Morton photographs 6560, 16703). According to Roxburgh, the species was "found by Captain Hardwicke on the tops of the mountains between Hurdwar and Sirinagur," now Hardwar, United Provinces, and Srinagar, Kashmir.

In the "Index Filicum," *P. squarrosum* Roxburgh is listed under *Polystichum lobatum* var. 4 as though it were a transfer of *Aspidium squarrosum* to *Polypodium*, but it obviously is not, for Don's species was published more than ten years after Roxburgh's death. Roxburgh's species was described as new, but taxonomically it appears the same as Don's later species with the same epithet, an apt epithet referring to the squarrose and conspicuous stipe scales. I have not seen the type of Don's species,

however, and cannot be sure that it is identical. The whole group of *Polystichum aculeatum* in India is in an inextricable tangle at present, and it will take monographic study to straighten it out. The name *P. squarrosum,* however, will likely remain as a correct name, since it is older than competing epithets other than *P. aculeatum* (L.) Schott, *P. setiferum* (Forssk.) Moore ex Woynar, and *P. lobatum* (Hudson) K. B. Presl; any one or all of these three may be correct for Indian species, although, all are founded on European types.

115. POLYPODIUM TENERUM Roxburgh, Calcutta Journ. Nat. Hist. 4:490. 1844. = ?**Thelypteris sericea** (Scott ex Bedd.) Reed, Phytologia 17:313. 1968.

?*Lastrea sericea* J. Scott ex Beddome, Ferns Brit. India *t. 308.* 1867. Type: Chittagong, *J. Scott* (BM, Morton photograph 20859, marked as original for *t. 308.*)

?*Lastrea calcarata* var. *sericea* (J. Scott ex Bedd.) Bedd., Handb. Ferns Brit. India 237. 1883.

?*Dryopteris pseudocalcarata* C. Chr. Ind. Fil. Suppl. 3:95. 1934. Based on *Lastrea sericea* J. Scott ex Bedd., non *Dryopteris sericea* C. Chr. 1913.

TYPE: No specimens from the Roxburgh Herbarium have been located. The species was collected in Silhet, East Pakistan, by M. R. Smith in 1811, (cf. Hort. Bengal. 75. 1814), and was cultivated in the Calcutta Botanic Garden.

The original description is: "Fronds alternately-pinnate; pinnae linear-lanceolate, gash-serrate, acuminate. Fructification in a few spots on each side of the veins; involucre reniform. A native of Silhet. In the Botanic Garden at Calcutta, it grows to the height of from 12 to 18 inches, is of a delicate soft texture, and somewhat villous." This description seems surely to represent a species of *Thelypteris* sect. *Lastrea,* from the small size, simply pinnate blades, delicate texture, villous condition, and reniform indusia. The only species I have found that grows in the region of Silhet, which belongs in the region known as Chittagong formerly, is the one described as *Lastrea sericea* J. Scott ex Bedd. This species was growing in the Calcutta Botanic Garden as late as 1869, for C. B. Clarke collected it there on Nov. 15, 1869 (*Clarke* 10375, BM, Morton photograph 20860); Clarke reported that the cultivated plant had come originally from Chittagong. My guess is that the plant Scott collected and marked as from Chittagong, the type of *Lastrea sericea,* was actually collected in the Calcutta Botanic Garden, from the same plant or plants that served Clarke, and that these were the same plants or descendants of Roxburgh's original *Polypodium tenerum.* Many of

Roxburgh's plants did survive in the garden throughout the nineteenth century (and perhaps still do), but many lost their labels, if they ever had any. Thus Roxburgh's *P. tenerum,* an appropriate name for a plant of this delicate texture, and Scott's *Lastrea sericea,* also an appropriate name for a plant that is obviously pubescent, may have been based on the same material. I feel that this is true, and yet in the absence of any Roxburgh specimen I should hate to propose a new combination, even though Roxburgh's name has priority. Moreover, this plant belongs to a troublesome group of species that are perhaps not quite properly delimited by Ching in his paper on Sikkim-Himalaya *Thelpteris.* In particular, the species called by Ching *Thelpteris cana* (J. Smith) Ching is impossibly confused. The basionym cited is a nomen nudum, based on material from northern India, and all the references cited by Ching refer to plants from northern India, although Ching states that his species occurs only in southern India. He cites as "type" a Wight collection not mentioned in any of the cited synonyms. It seems that *Thelypteris cana* Ching must be treated as a new species, and since it was published after 1935 yet has no Latin diagnosis, it is invalid and can be disregarded. Still, it would be interesting to know what plant was intended.

116. POLYPODIUM TOMENTOSUM Roxburgh, Calcutta Journ. Nat. Hist. 4:483, *t. 29* (right). 1844, non DuPetit Thouars, 1804, non Bory, 1833.
=**Pyrrosia flocculosa** (D. Don) Ching, Bull. Chin. Bot. Soc. 1:66. 1935.
Polypodium flocculosum D. Don, Prodr. Fl. Nepal. 1. 1825. Type: Narainhetty, Nepal, *Buchanan-Hamilton* (not seen).
Cyclophorus flocculosus (D. Don) C. Chr. Ind. Fil. 199. 1905.
Polypodium detergibile Hook. Sp. Fil. 5:49. 1864. Type: Based on various collections from Bhotan (*Griffith*), Nepal (*Wallich* as *P. vestitum* in Herb. Hook.), Simla (*Madden, Edgeworth*), Kumaon, and Sylhet and Assam (*Strachey & Winterbottom, Hooker f. & Thomson*). Of these I choose Kopkut, Kumaon, *Strachey & Winterbottom* 402 as lectotype (K, Morton photograph 20653). Hooker's comment "J.Sm.? vix Don?" is hardly comprehensible, since there are no species named *detergibile* by J. Smith or Don.

LECTOTYPE: A Roxburgh specimen in the East India Company Herbarium, no. 269-3 (Morton photograph 15736, upper left-hand plant). According to Roxburgh, this species was collected in "Hindoostan, on trunks of trees"; by Hindoostan Roxburgh was probably referring to West Punjab (now in Pakistan), East Punjab, or Rajasthan in northwestern India as distinguished from Bengal in eastern India. An authentic drawing by Roxburgh agreeing with the published illustration is at Kew, no. 1746 (Morton photograph 15875). On the sheet with the lectotype are two plants at the right hand representing *Polypodium mysurense* Heyne ex Wallich, Num. List. no. 269. 1829, nom. nud. [=*Pyrrosia mollis* (Kunze) Ching]. The plant at the lower left is Herb. Wight, also *P. mollis.*

117. POLYPODIUM TRIDENTATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:495. 1844. =**Thelypteris torresiana** (Gaud.) Alston, Lilloa 30:111. 1960.

Polystichum torresianum Gaud. *in* Freyc. Voy. Bot. 333. 1824. Type: Marianna Islands, *Gaudichaud* (Holttum, Blumea 17:27. 1969, states the type is in Paris, but it has not been located there; the holotype is in Geneva, according to Dr. F. R. Fosberg).

Macrothelypteris torresiana (Gaud.) Ching, Acta Phytotax. Sinica 8:310. 1963.

LECTOTYPE: A specimen (Morton photograph 19726) from the Roxburgh Herbarium in Brussels with the locality Banda, the number 327, and the date May, 1797; although not so indicated, the collector was surely Christopher Smith, who was collecting in the Molucca Islands in 1797. Two duplicates in Brussels are evidently a part of the same collection (Morton photograph 19727). An isotype is in Geneva, indicated as "Banda, Dr. Roxburgh" with a label reading "Typus" (Morton photographs 6559, 16648). A sheet in the J. E. Smith Herbarium (no. 1625-145) in the Linnean Society (Morton photograph 20246) is another probable isotype, for it agrees with the lectotype above completely, however, it is indicated as having been collected by Christopher Smith in Amboina in 1797; the locality "Amboina" is likely an error for "Banda," although it is quite possible that Smith did collect this species twice, once in Banda and once in Amboina.

Holttum (Blumea 17:25–32. 1969) has recently recognized *Thelypteris torresiana*, *T. setigera* (Blume) Ching, and seven other Asiatic and Malesian species as a genus *Macrothelypteris*, distinct from *Thelypteris*, following the lead of Ching, but he did not explain why it is necessary to recognize this or other groups as genera rather than as subgenera or sections. The only characters used to separate the genera *Macrothelypteris* and *Pseudophegopteris* are the presence generally of hair-pointed scales on the axes and the presence of multicellular, hyaline hairs in the former; *Pseudophegopteris* has scales (but not hair-pointed scales), and hairs (but these are unicellular). Such vegetative differences may be important and indicate relationships, but there is no necessary reason that they should be considered generic characters, rather than subgeneric. The characters mentioned have very recently been discussed by Pichi-Sermolli (Webbia 24:713–717. 1970), who has also indicated the type of *Macrothelypteris* as *Nephrodium oligophlebium* Baker correctly. Holttum proposed to change the designated type to another species, *Polystichum torresianum* Gaud., but this is not permissible.

118. POLYPODIUM UNITUM sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:488. 1844, non L., 1759. =**Thelypteris totta** (Thunb.) Schelpe var. **hirsuta** (Mett.) Morton, Contr. U. S. Nat. Herb. 38:73. 1967 (with synonymy).

AUTHENTIC MATERIAL: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19682). A Roxburgh drawing at Kew (no. 1749) (Morton photograph 15876) labeled

Polypodium unitum is apparently not the same thing and must remain unidentified.

Roxburgh did not consider this a new species but referred it to Burmann, presumably Burm. f. Fl. Ind. 232. 1768, although not so stated, but Burmann merely quoted Linnaeus, who is the author of *Polypodium unitum*. Roxburgh cited "Burm. zeyl. *t. 44, f. 1*," which is one of the original citations by Linneaus for this species. Roxburgh was not the only one to misapply the name *unitum* to *Thelypteris totta*, for this was the common opinion up until this century, and the matter is perhaps still not definitely settled.

119. PTERIS AMPLEXICAULIS Roxburgh, Calcutta Journ. Nat. Hist. 4:505. 1844. =**Pteris vittata** L. Sp. Pl. 1074. 1753. Type: China, *Osbeck*.

LECTOTYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19893). Roxburgh cited as locality: "Nat. of Bengal, in shady, moist places. Also among ruins of brick buildings. Is sometimes parasitical," which indicates that he had several specimens in hand; this is borne out by the specimens seen, all of which represent *P. vittata*, but they are not identical and were probably collected at different times and places. These syntypes are: "Ind. or.," *Roxburgh* in Herb. Mart. (BR, Morton photograph 19895); Bengal, *Roxburgh* (BM, Morton photograph 7563); without locality, *Roxburgh* (East Ind. Co. Herb. 112-4, K, with name in the hand of Roxburgh, Morton photograph 19587b); Botanical Garden [Calcutta], this sheet probably collected by Wallich, Dec. 11, 1814 (East Ind. Co. Herb. 112-4, K, Morton photograph 15718); drawing by Roxburgh (K, no. 1753, labeled *P. vittata* rather than *P. amplexicaulis*, Morton photograph 15883; same drawing BM, Morton photograph 15777).

As mentioned under *Pteris vittata* sensu Roxburgh, Roxburgh misidentified another species as *P. vittata* L. and redescribed the true *P. vittata* as a new species *P. amplexicaulis*.

120. PTERIS ANGUSTIFOLIA sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:503, *t. 33* (left). 1844, non Swartz, 1788. =**Vittaria** sp.

No herbarium specimens have been seen, only the published drawing and two original drawings representing the same plant at Kew (no. 1751, Morton photograph 15878) and the British Museum (Morton photograph 15775). The Kew drawing was first named "*Pteris parasitica*," which was changed in a different hand to "*Pteris angustifolia* Roxb." The name "*P. parasitica*" was never published, and the name "*Pteris angustifolia*" appears in the printed work attributed to Swartz rather than Roxburgh. (Roxburgh's own species are, at least usually, indicated with an "R.") Therefore, *P. angustifolia* must be considered as a misidentification of *P. angustifolia* Swartz and not as a new species.

The true *P. angustifolia* Swartz might appear from a diagnosis to be the same, but that is a quite different species, now known as *Ananthacorus angustifolius* (Swartz) Underw. & Maxon. Roxburgh's plant was from "the Delta of the Ganges, where it is found growing on the trunks of trees, intermixed with mosses, etc. parasitic plants, of various kinds." It was collected in 1796, according to Roxburgh (Hort. Beng. 75. 1814), and cultivated in the Calcutta Botanical Garden.

From the description and drawing I am unable to identify Roxburgh's plant specifically. If one knew which species of *Vittaria* grew in the Delta of the Ganges, one could probably identify the species correctly, but I do not have this information. The plant is shown as having a rather broad blade, and so it may be *Vittaria amboinensis* Fée as treated by Ching (Sinensia 1:189. 1931) or a small form of *V. scolopendrina* (Bory) Thwaites.

121. PTERIS BICOLOR Roxburgh, Calcutta Journ. Nat. Hist. 4:507. 1844.
=**Cheilanthes farinosa** (Forssk.) Kaulf. Enum. Fil. 212. 1824.

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh and the number 2416 (Morton photograph 20004). The locality is given by Roxburgh as "mountains north of Rohilcund," i.e., the present Rohilkhand, in the Division of Agra, Northern United Provinces. Another specimen, an isotype, is in the East India Company Herbarium, no. 71-5 (K, Morton photograph 14698, upper and lower left-hand plants and the small plant upper center).

To the original description Griffith added the reference "*Cheilanthes dealbata* Wall. Cat. 61, no. 71," which does not refer to the main entry under no. 71 (which is *C. dealbata* Wall.) but to the entry on page 61, referring to no. 71-5, the Roxburgh collection; the meaning is not that *Pteris bicolor* is a renaming of *Cheilanthes dealbata* Wall. but merely a particular entry in the Wallich List, namely no. 71-5. In any case, *Cheilanthes dealbata* Wallich is a nomen nudum. It cannot be assumed that it is the same as *C. dealbata* D. Don, which is not mentioned; and the name *C. dealbata* is attributed to himself by Wallich. As a matter of fact, *Cheilanthes dealbata* D. Don (1825) is an illegitimate later homonym of *C. dealbata* Pursh, a quite different plant of North America, and so was in need of renaming. If *Pteris bicolor* Roxburgh is the same as *Cheilanthes dealbata* D. Don, and if this species is distinct from *C. farinosa*, then the epithet *bicolor* will be correct.

Pteris bicolor Roxburgh was correctly understood in the "Index Filicum." There is a drawing in the British Museum of *Cheilanthes farinosa* that might be by Roxburgh (Morton photograph 15758). A revision of the Asiatic species of this alliance

was published by Ching (Hong Kong Natur. 10:194–204. 1941), who, however, overlooked the name *Pteris bicolor* Roxburgh.

122. PTERIS DAUCIFOLIA Roxburgh, Calcutta Journ. Nat. Hist. 4:508. 1844. =**Onychium siliculosum** (Desv.) C. Chr. Ind. Fil. 468. 1906. Type: "America australis," Herb. Desvaux, P. (fide Ching); the locality is surely an error, since *Onychium* does not occur in South America, and the species represented by the type is exclusively Asiatic; Ching (Lingnan Sci. Journ. 13:493–501. 1934) suggested that the type came from the Philippine Islands, since a specimen collected by Gaudichaud in Manila matches it exactly.

TYPE: Manipur, Assam, India, *Roxburgh* (holotype BR, Morton photograph 20008). This is one of the few Roxburgh collections in Brussels bearing a definite locality; the original locality was stated as "eastern parts of Bengal," which included Assam in Roxburgh's time. Since this is the only collection seen in any herbarium, it may be presumed to be a holotype.

In the "Index Filicum," *Pteris daucifolia* is referred with a query to *Cheilanthes tenuifolia* Swartz, on what grounds I do not know. The description, although brief, clearly indicates *Onychium* rather than *Cheilanthes* in the character of the fertile segments being linear with the margins completely occupied by the fructifications.

123. PTERIS DIMIDIATA Roxburgh, Calcutta Journ. Nat. Hist. 4:507. 1844, non Willd., 1810. =**Pteris semipinnata** L. Sp. Pl. 1076. 1753.

LECTOTYPE: East India Company Herbarium, no. 97-3 (left-hand plant) (K, Morton photograph 14725). A duplicate is in the British Museum collected in Silhet by Smith, Herb. Roxburgh (Morton photograph 20853). Roxburgh stated that his plant came from Chittagong, where it was collected by M. R. Smith in 1811 (Hort. Bengal. 75. 1814). Silhet is in the region called Chittagong by Roxburgh and others in the early nineteenth century.

Pteris dimidiata Roxburgh is omitted in the "Index Filicum," probably because it was assumed the same as *Pteris dimidiata* Willd. (Sp. Pl. ed. 4, 5:381. 1810). However, Roxburgh did not cite Willdenow but himself as author, and indeed he does not mention Willdenow's fern volume of the "Species Plantarum" in any place, which he surely would have if he had seen it. Therefore, Roxburgh must have written his description and assigned the name *dimidiata* independently, which is not unlikely considering that the epithet *dimidiata* is a natural one for a plant with pinnae of this particular shape. Both Roxburgh's and Willdenow's species seem to be surely *Pteris semipinnata* L., and it is strange that they did not realize this.

After Roxburgh's name, Griffith added "*Pteris semipinnata* Linn. Wall. Cat. 62, No. 97," but this is not a reference to *P. semipinnata* L. of 1753, but only that Roxburgh's plant is *P.*

semipinnata sensu Wallich as to a plant listed on page 62 of his "List" under the number 97 (which should have been no. 97-3).

The other specimen mounted on no. 97-3 on the right-hand side was collected at Sylhet by Di Silva, a collection not listed by Wallich; it is a topotype of Roxburgh's species.

124. PTERIS GRACILIS Roxburgh, Calcutta Journ. Nat. Hist. 4:508. 1844, non Michx., 1803. =**Pteris ensiformis** Burm. f. Fl. Ind. 230. 1768.

LECTOTYPE: A Roxburgh specimen in the British Museum, collected in Silhet by Smith (Morton photograph 20852). Roxburgh stated that his plant came from Chittagong, the name of his time for the region in which Silhet is found. The collector was surely M. R. Smith, who collected other plants for Roxburgh in Silhet.

In the "Index Filicum," *Pteris gracilis* Roxburgh is referred without a query to *Cheilanthes tenuifolia* Swartz, but this is an obvious error, for the original description does not agree with that species. The description does agree in all particulars with *Pteris ensiformis*. Although the name *P. gracilis* does not occur on the specimen selected as lectotype, there can be no doubt that it does represent Roxburgh's species and is probably indeed the holotype, since no other Roxburgh specimen of this species has been found in other herbaria.

A Roxburgh specimen of *Cheilanthes tenuifolia* Swartz in Brussels (Morton photograph 20005) is not named by Roxburgh and does not agree with Roxburgh's description of his *P. gracilis*.

125. PTERIS GRAMINIFOLIA Roxburgh, Calcutta Journ. Nat. Hist. 4:502, *t. 33* (middle). 1844. =?**Vittaria elongata** Swartz, Syn. Fil. 109, 302. 1806. Type: "India orientalis," *Rottler* (holotype S-PA, Morton photograph 6105).

TYPE: Roxburgh *t. 33* (middle plant). Since no herbarium specimens of this species have been located, the published illustration will have to stand as the type, pro tem. According to Roxburgh (Hort. Beng. 75. 1814), it was collected in Silhet [Sylhet] by M. R. Smith in 1811.

The entire original description is: "Parasitic. Fronds linear, very long (2–3 feet) entire pendulous. Nat. of the close dark forests of Silhet, where it is found suspended on trees, resembling long tufts of long, narrow-leaved grass." In the "Index Filicum," *P. graminifolia* is referred to *Vittaria elongata* Swartz, and this may be correct. If the discovery of a herbarium specimen should prove this wrong, the epithet "*graminifolia*," although legitimate, could never be transferred to *Vittaria*, because there already exists a valid and different species *Vittaria graminiifolia* Kaulf. (1824).

126. PTERIS LINEARIS Roxburgh, Calcutta Journ. Nat. Hist. 4:505. 1844, non Poir., 1804. =**Pteris vittata** L. Sp. Pl. 1074. 1753, sens. lat.

TYPE: Amboina, 1796, *Roxburgh* 310 (BR, Morton photograph 19892). The type was surely collected by Christopher Smith, who was in Amboina in 1796. The detached stipe on this type sheet is large and coarse and surely does not go with the type frond. It may go with another sheet in the Brussels Herbarium, also labeled *Pteris linearis* in the hand of Roxburgh, which bears the number 2415 (Morton photograph 19894). This second specimen is not marked as from Amboina, and it may conceivably represent a different species, since the blade is a good deal larger and the stipe thicker than that of *P. vittata*. Since it is not the type, the placing of it is not of importance. A specimen in the East India Company Herbarium, no. 111-7 (K, Morton photograph 15717), is determined as "*P. vittata* & *linearis* Hb. Roxb."; the small fragment at the upper right seems to agree with the lectotype of *P. linearis*, and the larger plant with the specimen in Brussels indicated above as larger and possibly different.

In the "Index Filicum," *P. linearis* Roxburgh is listed as a dubious species, with the notation "an Wall.?," referring to the preceding entry *Pteris linearis* Wall. List, no. 105. 1828. However, Roxburgh's species is by no means the same as that, which is considered to represent *Pteris tripartita* Swartz. *Pteris linearis* Roxburgh is a form of the common and variable *P. vittata* L., which may be an aggregate; it has a number of somewhat doubtful synonyms.

127. PTERIS LOBATA Roxburgh, Calcutta Journ. Nat. Hist. 4:504. 1844, non Goldm. 1843. =**Polypodium scolopendria** Burm. f. Fl. Ind. 232. 1768.

TYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19928). According to Roxburgh the type came from the Moluccas, where it was doubtless collected by Christopher Smith in either Amboina, Ternate, or Honimoa. Since this is the only specimen seen with the name in Roxburgh's hand, this may be considered unique and a holotype.

In the "Index Filicum," *Pteris lobata* Roxburgh is listed as a dubious species, and with good reason, for the original description is merely "Petiole smooth, nearly as long as the thin, polished, 2 or 3 lobed fronds," quite the shortest and most inadequate of Roxburgh's descriptions. One could never guess the identity of the species if a type had not been located. Roxburgh's type was sterile, but even so his reference to *Pteris* rather than *Polypodium* must be considered a temporary aberration.

128. PTERIS LUNULATA sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:506. 1844. =**Adiantum lunulatum** Burm. f. Fl. Ind. 235. 1768. Lectotype: A Burmann specimen in Geneva with the notations "Capillaris malab. non ramosa folio rotundodentato, Petiv. Tab. 59, f. 10. H. Mal. tom. 12 tab. 40" (Morton photograph 16782).

MATERIAL EXAMINED: A specimen in Brussels with the name *Pteris lunulata* Retz.? in the hand of Roxburgh (Morton photograph 19875); a specimen in the East India Company Herbarium, Kew, no. 77-8 (Morton photograph 15730, left-hand plant). Roxburgh did not localize his material, but stated that the species was common in most parts of India.

Roxburgh attributed his plant to "Retz. Obs. 2, No. 99, *t. 4*," and wrote "Common in most parts of India, sometimes the margin is broken, when it resembles an *Adiantum*, and is very likely *A. lunulatum*, but at all times sufficiently distinct." This shows a little confusion, for *P. lunulata* Retz. is based on *Adiantum lunulatum* Burm. f., and is thus taxonomically identical. Roxburgh was attempting to distinguish between plants with the indusial flaps elongate and unbroken, calling these a *Pteris*, and plants with several separate indusia, calling these an *Adiantum*. Both forms occur in typical *Adiantum lunulatum*, as shown by Mehra and Verma (Journ. Indian Bot. Soc. 42A:110–121. 1963). They have not been given distinctive names.

I am adopting the name *Adiantum lunulatum* Burm. f. rather than *A. philippense* L. in conformity with the arguments adduced by Verma (Nova Hedwigia 3:463–468. 1961). *Adiantum philippense* L. was based solely on a drawing by Petiver which is so poor as to be unidentifiable; the drawing cannot really be matched by any specimen, and so *A. philippense* L. ought to be regarded as a dubious and permanently unidentifiable species, for its identity as conspecific with *A. lunulatum* can be guessed at but never proved. On the other hand, *A. lunulatum* has a good type specimen extant, and its identity is definitely established. Mehra and Verma in the publication cited are able to identify the type with a collection that has been cytologically analyzed, and find that it is a sterile triploid, which is apparently the common form in much of India. Other forms do occur—apogamous and sexual diploids and sexual tetraploids—which may be distinguished morphologically somewhat, but no names have been applied to these.

129. PTERIS MULTIFIDA Roxburgh, Calcutta Journ. Nat. Hist. 4:507. 1844, non Poir., 1804. = **Doryopteris ludens** (Wallich ex Hook.) J. Smith, Hist. Fil. 289. 1875. Basionym: *Pteris ludens* Wallich ex Hook. Sp. Fil. 2:210. 1858.

LECTOTYPE: A specimen in the British Museum collected by Roxburgh, without further data (Morton photograph 15786). The specimen does not have the name *P. multifida* written on it (except by me in 1967), but it does agree clearly with Roxburgh's description and is surely authentic. Since it is the only Roxburgh herbarium specimen seen of the species, it is designated the lectotype. If another specimen should be found with the name

written on it, that specimen can replace the present one as a lectotype. Roxburgh's plant came from Chittagong, East Bengal, now in East Pakistan.

It is fortunate that Roxburgh chose an epithet "*multifida*" that had already been used in *Pteris* for another species, or otherwise the rather well-known name *Doryopteris ludens* would have to be replaced. *Pteris ludens* Wallich appeared in Wallich's "Numerical List" as no. 88 in 1829, but only as a nomen nudum, and the name was not validated until the publication by Hooker in 1858, 12 years after the publication of Roxburgh's name. Tryon (Contr. Gray Herb. 143:60. 1942) stated that the type of *Pteris ludens* is "India, *Wallich* 88, Kew, not seen, photo G, seen," but this is not correct. When published, *Pteris ludens* Wallich ex Hook. contained no type but four syntypes. Tryon's designation of *Wallich* 88 as the type might be considered as a selection of a lectotype, except for the fact that Wallich List no. 88 consists of two different collections: one Scendnea, Irawaddy, *Wallich* in 1826, and the other Caves of the Mountain Nidan, Assam River, *Wallich* in 1827. Tryon cannot really be properly credited with having selected a lectotype, since that can hardly consist of two specimens from different localities. I designate the collection from Irawaddy in Kew as lectotype; this is presumably the one intended by Tryon, since it is the one represented by a photograph by Una F. Weatherby, in the Gray Herbarium.

130. PTERIS PECTINATA Roxburgh, Calcutta Journ. Nat. Hist. 4:507. 1844, non Cav. 1802, non Desv. 1811, non Don, 1825. =**Pteris longipinnula** Wallich ex Agardh, Rec. Gen. Pterid. 19. 1839. Types: Mountains of Penang, *Wallich* List no. 108 (K-Hb. Hook., Herb. Linn Soc. London—now K-E. Ind. Co. Herb. no. 108—Morton photographs 19586, 19586a). The two sheets in the East India Company Herbarium are designated lectotype.

TYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19896). Since this is the only specimen seen of this species from the Roxburgh Herbarium, it must be considered a holotype.

In the "Index Filicum," *P. pectinata* Roxburgh is listed as a dubious species. The type has been identified by Baker as *P. longipinnula* Wallich, which is correct. Roxburgh indicates the type as being from the Molucca Islands, which may very well be right; however, I have seen no other specimens from there. It may be that "Moluccas" was a slip and that the plant actually came from Penang, where *P. longipinnula* came from also. Holttum in his "Ferns of Malaya" describes (but does not name) three forms of the species as it grows in Malaya aside from the typical form. Roxburgh's *P. pectinata* (a homonym three times

over) agrees with the typical form. The other forms, which have basally forked lower pinnae, may represent hybrids, as Holttum remarks, possibly with *P. asperula* J. Smith ex Hieron. A variation of this kind (in mature plants) is hardly to be expected within a normal species.

The above identification of *P. pectinata* with *P. longipinnula* is a bit doubtful. The latter has three or four pairs of subopposite lateral pinnae. Only the basal pair of pinnae are present in the Roxburgh type; Roxburgh noted that the pinnae are few and opposite, and so it is likely that the species is similar to *P. longipinnula* in this respect. There are plants from Java and Sumatra, probably not specifically different from *P. longipinnula,* that seemingly have only a single pair of pinnae, with an elongate, subconform terminal apex ("pinna"). Such a one is *Pteris megaphylla* Mett. ex Miquel (Ann. Mus. Lugd. Bat. 4:96. 1868). I have seen a syntype—Sumatra, *Korthals* (L, Morton photograph 2178). This species was placed as a synonym of *P. biaurita* L. in the "Index Filicum," but it is not that, because the veins are free and not united into a costal arc. An extremely similar, if not identical, plant is *Pteris salakensis* van Alderw. van Rosenb. (Bull. Jard. Bot. Buitenzorg II, 7:26. 1912), the type of which was a cultivated plant in the botanical garden at Bogor, said to have been brought originally from Mount Salak, Java. I have seen an isotype (or the holotype?) in Leiden (Morton photograph 2160). The latter species was said in the third supplement of the "Index Filicum" to equal *P. reducta* Baker, but from Baker's description that hardly seems possible.

Much more distinct is *Pteris longipinnula* var. *hirtula* C. Chr. (Contr. U. S. Nat. Herb. 26:312. 1931), and it seems to me that this must represent a distinct species—*Pteris* ***hirtula*** (C. Chr.) Morton, comb. nov. In *P. longipinnula* the stipe and rachis are a shining olive green and are absolutely glabrous. *Pteris hirtula* has the stipe and rhachis stramineous, and both are obviously and strongly pubescent. The latter character is most unusual in *Pteris*. This species is still known only from the material seen by Christensen—the type from the valley of Meh Len, Keng Tung Territory, Burma, *Rock* 2133 and 2091 (both US). The type has three pairs of lateral pinnae, whereas the paratype has only a single pair, thus paralleling the difference between typical *P. longipinnula* and *P. megaphylla,* mentioned above.

131. PTERIS PEDATIFIDA Roxburgh, Calcutta Journ. Nat. Hist. 4:508. 1844.
=**Pteris tripartita** Swartz, Journ. Bot. Schrad. 1800(2):67. 1802.
Type (from Swartz, Syn. Fil. 293. 1806): Java, *Thunberg.*

Pteris intermedia Blume, Enum. Pl. Jav. 2:211. 1828. Type: Celebes, *Reinwardt* (holotype L, Morton photograph 2218).

LECTOTYPE: A sheet in the Brussels Herbarium with the name in the hand of Roxburgh and the number 2419 (Morton photograph 19904). Roxburgh gave the localities as Molucca Islands and Malay Islands; this lectotype presumably came from the Moluccas where it was presumably collected by Christopher Smith, since it agrees with a Smith collection from Honimoa, April, 1797, now in the herbarium of J. E. Smith, no. 1634-3 (LINN, Morton photograph 20285), which is an isosyntype. Two other Roxburgh specimens in Brussels (Morton photographs 19905, 19906) are not localized and do not bear the name in Roxburg's hand, but they are surely syntypes also. They are conspecific but just slightly differently dried, and so I judge that these are not duplicates of the lectotype chosen above but may represent the second locality cited by Roxburgh, namely "Malay Islands," which in this case surely means Penang Island, Malaya. The species does grow in the Moluccas and in Penang.

In the "Index Filicum," *Pteris pedatifida* Roxburgh is listed as a dubious species.

Another plant, *Pteris attenuata* Swartz (Journ. Bot. Schrad. 1800(2):66. 1802), was also collected in Java by Thunberg. In the "Index Filicum," this is given as a synonym of *P. tripartita*, but it may be different, judging by a fragment in the Swartz Herbarium in Stockholm (Morton photograph 6259) which shows a plant with the pinnules pinnatisect almost or quite to the costa and the segments elongate and almost linear. This fragment was probably removed by Swartz from the holotype in the Thunberg Herbarium, but there is some confusion, for it is labeled as being from "Cap B. Spei," i.e., the Cape of Good Hope, South Africa. It remains to be determined if the original Thunberg collection was from Java or from South Africa. If it is really from South Africa it may represent the later described *Pteris buchananii* Sim; if it is from Java it may be distinct from *P. tripartita*, sens. str., and probably the same as *P. tripartita* var. *dissoluta* van Alderw. van Rosenb. (Bull. Jard. Bot. Buitenzorg II, 23: 20. 1916), the type of which came from Benkoelen Lebong Tandai, Sumatra, *Brooks* 2238 [cited as 223/S] (isotype L, Morton photograph 2220).

132. PTERIS PILOSELLOIDES sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:503. 1844. =**Drymoglossum piloselloides** (L.) K. B. Presl, Tent. Pterid. 227, *t. 10, f. 5,6.* 1836. Basionym: *Pteris piloselloides* L. Sp. Pl. ed. 2, 1530. 1763.

Roxburgh referred his *P. piloselloides* to Linnaeus and did not describe it as a new species. His description and drawing at Kew (no. 2576, Morton photograph 15880) show that his plant was indeed the Linnaean species. *Pteris piloselloides* L. came from

"India orientalis," but has not been typified. Christensen did not mention a type in his rather detailed account of *Drymoglossum* (Dansk Bot. Ark. 6(3):83–91. 1929). Since Linnaeus did not cite any literature references, it is clear that his species is based on a specimen. This is not in the Linnean Herbarium in London, and so should be sought elsewhere, first in Stockholm, Lund, and Uppsala. Roxburgh's drawing is not a bad illustration of this species. No Roxburgh herbarium specimens have been found. His plant came from Chittagong, now in East Pakistan, where it was collected by John Roxburgh in 1810 (Hort. Beng. 75. 1814).

133. PTERIS QUADRIAURITA sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:507. 1844. =**Pteris quadriaurita** Retz. Obs. Bot. 6:38. 1791, sens. lat.

Roxburgh attributed the name *P. quadriaurita* to Retzius, rightly, and drew his description from a plant native in the Moluccas. The only specimen seen that is authentic for Roxburgh's concept is in the J. E. Smith Herbarium, no 1631-13 (LINN, Morton photograph 20275, left-hand plant). This specimen was collected on Honimoa, Ceram, by Christopher Smith in 1797. The right-hand plant on this sheet may have been a part of Roxburgh's concept also; it is from Amboina, Christopher Smith in 1797; it is not the same as the Honimoa plant, since the lower pinnae lack the basal fork that is characteristic of plants of *P. quadriaurita* and its allies. The proper names of the Malaysian species of this group can hardly be determined without a detailed monographic study.

134. PTERIS SCANDENS Roxburgh, Hort. Bengal. 75. 1814; Calcutta Journ. Nat. Hist. 4:505. 1844. =**Stenochlaena palustris** (Burm. f.) Underw. Bull. Torr. Bot. Club 33:38. 1906 (wrongly attributed to Beddome).

Polypodium palustre Burm. f. Fl. Ind. 234. 1768. Lectotype: Ceylon, *Burmann* (selected by Underwood, Bull. Torr. Bot. Club 33:38. 1906).

TYPE: Considered published in the "Hortus Bengalensis" by the citation of Rheede, Hort. Ind. Malab. 12:*t. 35*, which is thus the type. No Rheede specimens are presumed to exist. Roxburgh's concept is illustrated by two specimens from the Roxburgh Herbarium (BR, Morton photographs 19841, 19842); there is also an authentic drawing at Kew (no. 1752, Morton photograph 15881). These specimens and the drawing seemingly represent the same species as the Rheede illustration. According to Roxburgh they came from India.

There has been some confusion about this name, for in the "Index Filicum" it is cited under *Stenochlaena palustris* as though *P. scandens* Roxburgh were a transfer of *Onoclea scandens* Swartz (1806), but this is clearly wrong. Roxburgh did not cite this name of Swartz and probably did not even know of its

existence, for nowhere in his work does he refer to Swartz' "Synopsis Filicum" of 1806, the place where *Onoclea scandens* was published. The epithet *"scandens"* would be a natural one for this fern and was doubtless arrived at independently.

It might be thought that *Pteris scandens* Roxburgh is a superfluous name for *Polypodium palustre* Burm. f., because the illustration of Rheede, its type, was also cited by Burmann f. under his *Polypodium palustre*. This would not be right, however, because the Rheede illustration was only one of several elements included in *Polypodium palustre* Burm. f., and Roxburgh's *Pteris scandens* is technically a segregate, a name applied to one of the elements included in *Polypodium palustre* and not a renaming of that species.

Stenochlaena palustris has been passing with the author "(Burm. f.) Beddome, Ferns. Brit. Ind. Suppl. 26. 1876," as in the "Index Filicum," in Underwood's paper cited above, and in Holttum's paper on *Stenochlaena* (Gard. Bull. Str. Settl. 5:254. 1932), but I do not think this is correct. Beddome in the place cited listed the plant as *"Stenochlaena palustre* L. *Ferns Southern India, tab. 201 (scandens)."* There is no species *"Stenochlaena palustre* L.," obviously, since *Stenochlaena* was not published until 1841, many years after the death of Linnaeus, nor did Linnaeus publish this species under any genus or epithet. In the cited reference to the "Ferns of Southern India, *tab. 201"* one finds *Stenochlaena scandens* (J. Smith) and as a synonym *Lomaria scandens* Willd., but again no reference to Burmann or the epithet *palustre*. Therefore, it should not be assumed that Beddome really meant *Stenochlaena palustris* (Burm. f.) Beddome, when he wrote *Stenochlaena palustre* L. Diels (Nat. Pflanz. 1(4): 251. 1899) gave the authority as *"Stenochlaena palustris* (L.) Mett.," but this cannot be accepted either, for Mettenius never published such a combination and again the parenthetical authority "L." is incorrect. So far as I can determine, the first author to accept the name *Stenochlaena palustris* and cite *Polypodium palustre* Burm. f. as a synonym was Underwood, whose paper appeared a few months before Christensen's use of the same combination in the "Index Filicum." The incorrect association of this species with Linneaus is attributable to Swartz (Syn. Fil. 112. 1806), who cited *"Polypodium palustre* Linn. Fl. Zeyl. p. 200" as a synonym of his *Onoclea scandens*. Linnaeus did describe this species in his "Flora Zeylanica," page 200, as species no. 425 *"Filix, fronde pinnata, pinnis lanceolato-ensiformibus integris striatis setaceo-serratis,"* but he did not use the binomial *Polypodium palustre* (he was not using binomials in this

Flora) and in any case the Flora is of 1747, before the starting date for botanical nomenclature. For some reason, Linnaeus ignored or overlooked this species in his "Species Plantarum" and later works after 1753.

135. PTERIS SUCCULENTA Roxburgh, Calcutta Journ. Nat. Hist. 4:508. 1844.
=**Ceratopteris thalictroides** (L.) Brongn. Bull. Soc. Philom. 1821:186. 1821.

LECTOTYPE: A specimen from "Ind. or." collected by Roxburgh, in the J. E. Smith Herbarium, no. 1622-39 (LINN, Morton photograph 20348). A duplicate is in the same herbarium, no. 1622-38 (Morton photograph 20347). There is a presumable duplicate in the East India Company Herbarium, Kew, corresponding to Wallich, List no. 83-4. It is not indicated as collected by Roxburgh, but it agrees with the lectotype chosen above. There is no sheet indicated as 83-4, but this plant is where the Roxburgh collection might be expected, on the same sheet as 83-5 and 83-6 (Morton photograph 20664). Roxburgh did not cite a definite locality, merely "Nat. of various parts of India, in wet places." It was from Bengal, according to Voigt (Hort. Suburb. Calcut. 736. 1845). Roxburgh had a drawing of his *P. succulenta*, and copies of this are at Kew, no. 1754 (Morton photograph 15882) and the British Museum, marked as from Jungholy, Bengal, collected by J. Law (Morton photograph 15756). These drawings agree with the herbarium specimen chosen as lectotype.

In the original description is cited "*Acrostichum thalictroides* et *siliquosum*. Roxb. *Ceratopteris thalictroides*. Brongn. Wall. Cat. 61, No. 81." These entires were obviously added by the editor Griffith, since they refer to entries in Wallich's "Numerical List" published many years after Roxburgh's death. The first part refers to the entry in Wallich's Catalogue of "*Acrostichum thalictroides* et *siliquosum* Herb. Roxb." no. 83-4 (not "81" as stated by Griffith), and the "*Ceratopteris thalictroides* Brongn." to the main entry in Wallich under no. 83. There is now no Roxburgh specimen in the East India Company Herbarium under 83-4, unless it is misplaced. *Pteris succulenta* Roxburgh cannot be considered a superfluous name, since the synonyms "*Acrostichum thalictroides* and *siliquosum* Herb. Roxb." mean only that the plant occurs under these names on a specimen in the Roxburgh Herbarium, i.e., sensu Roxburgh, with no indication that they are the original *Acrostichum thalictroides* L. and *A. siliquosum* L. The matter is not of any importance unless it develops that the specimen chosen as lectotype of *P. succulenta* could be shown to be different from the original *Ceratopteris thalictroides* (L.) Brongn., which is not likely.

136. PTERIS TRIPINNATIFIDA Roxburgh, Calcutta Journ. Nat. Hist. 4:508. 1844.
=**Histiopteris incisa** (Thunb.) J. Smith, Hist. Fil. 295. 1875, sens. lat.

LECTOTYPE: A specimen from Honimoa, Ceram, no. 332, Roxburgh Herbarium (BR, Morton photograph 19907). This sheet does not bear the name *P. tripinnatifida*, but it does agree with Roxburgh's description, and it is the only sheet of Roxburgh's found that does agree. It may be presumed that the name tag has been lost and that this is truly the holotype; at least it is a suitable lectotype. Roxburgh gave the locality as merely "Moluccas," which can now be stated more definitely as Honimoa. The collector was surely Christopher Smith, who sent his Honimoa collections to Roxburgh.

Histiopteris incisa is a species of almost worldwide range as currently treated, but it may be an aggregate; however, lines on which it might be segregated are not clear.

137. PTERIS VITTATA sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:504. 1844, non L. =**Pteris moluccana** Blume, Enum. Pl. Jav. 208. 1828. Type: Banda Island, Molucca Islands, *Reinwardt* (holotype L, 2 sheets, evidently part of the same plant, Morton photographs 2202, 2203).

AUTHENTIC MATERIAL: A sheet in the Brussels Herbarium with the Roxburgh number 1682 and the name *Pteris spinulosa* in Roxburgh's hand, the "*spinulosa*" crossed out by Roxburgh and *vittata* substituted (Morton photograph 19899). There is a drawing at Kew (no. 1105) by Roxburgh labeled *Pteris vittata* L., which is intended to represent the same species, as it probably does.

Roxburgh did not actually mention Linnaeus in his treatment of *Pteris vittata*, but it may be presumed that he surely intended this, since he mentions "Osb. It. *t. 4*," and the type of *P. vittata* L. was China, *Osbeck*. He gave a long careful description of *P. vittata* and a comparison with his own *Pteris amplexicaulis*. His observations are correct, but unfortunately he had the names wrong, for his *P. amplexicaulis* is the true *P. vittata*, and the plant that he identified as *P. vittata* was at the time an undescribed species that Blume later called *P. moluccana*. Roxburgh's *P. vittata* was stated to be a "Native of the Delta of the Ganges, etc. Fructifies in the Botanic Garden most part of the year." The plant mentioned above as authentic must have been a part of the "etc." of Roxburgh's localities, and it must have been cultivated in the Botanic Garden in Calcutta. It was doubtless brought or sent from the Moluccas by Christopher Smith and grown in the garden, for this species, *Pteris moluccana*, does not grow in the delta of the Ganges or elsewhere in India. Apparently, Roxburgh confused some plants that he had seen in the wild with the cultivated plant in the Botanic Garden. His description agrees with *Pteris moluccana* and not with any Indian species.

138. SALVINIA CUCULLATA Roxburgh ex Bory *in* Bélanger, Voy. Bot. 2:6. 1833. *Salvinia cucullata* Roxburgh ex Wallich, Num. List. no. 399. 1829, nom. nud.

LECTOTYPE: A specimen in the Geneva Herbarium marked "India Orient. Dr. Roxburgh," another label "*Marsilea cyathoides*, Mayo, 1276," and a tag reading "Typus" (Morton photograph 16731). Roxburgh indicates that all three of his species of *Salvinia* were found "floating on lakes, or pools of sweet water, throughout Bengal."

Bory gave a short but adequate description of this species prior to the publication of the name by Roxburgh (Calcutta Journ. Nat. Hist. 4:470. 1844). In addition to material by Roxburgh, Bory cited also Calcutta, *Wallich*, and Hooglie, Bengal, *Bélanger*. There are thus three syntypes. Since the name is credited to Roxburgh, it is natural to choose the Roxburgh specimen as lectotype. I have seen the Wallich collection from Calcutta in the British Museum (Morton photograph 7721), and it is the same as Roxburgh's plant. I have not looked for a specimen of Bélanger's collection, but it is presumably the same, since this is a rather characteristic species that has always been correctly understood. Griffith (Calcutta Journ. Nat. Hist. 5:255. *t. XX, f. 21*. 1845) gave a more detailed description of this species.

139. SALVINIA IMBRICATA Roxburgh, Calcutta Journ. Nat. Hist. 4:470. 1844.
=**Azolla imbricata** (Roxburgh) Nakai, Bot. Mag. Tokyo 39:185. 1925.
Azolla pinnata **var.** *imbricata* (Roxburgh) Bonaparte, Notes Pterid. 7:130. 1918.

LECTOTYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh. Roxburgh indicated that his species was common throughout Bengal, and so he may have had more than one specimen in hand. Isotypes or syntypes are in Geneva (2 sheets, one Morton photograph 17029, the other with the name "*Marsilea imbricata*") and in the British Museum (Morton photograph 7718).

Griffith provided a very detailed description and drawings of this species in his paper "On Azolla and Salvinia" (Calcutta Journ. Nat. Hist. 5:257, *t. XV–XVI*. 1845) under the name *Azolla pinnata*. They represent actually *A. imbricata*.

This species has sometimes been considered the same as *Azolla pinnata* var. *africana* (Desv.) Baker (Fern Allies 138. 1887), which is based on *A. africana* Desv. (Mém. Soc. Linn., Paris 6: 178. 1827). The proper disposition remains to be determined.

140. SALVINIA VERTICILLATA Roxburgh, Calcutta Journ. Nat. Hist. 4:469. 1844. =**Salvinia natans** (L.) All. Fl. Pedem. 2:289. 1785.

LECTOTYPE: A specimen in the Geneva Herbarium labeled "Ind. Orient. Dr. Roxburgh" and with another label "*Marsilea bengalensis*, 1270" (Morton photographs 6555, 16732). Since this is the only specimen seen of a Roxburgh collection, it may well be a holotype. According to Roxburgh it occurs in lakes and pools throughout Bengal, India.

Griffith described this species in detail (Calcutta Journ. Nat. Hist. 5:254, *t. XVIII-XX.* 1845). If the plant of India should prove to be different from that of Europe, the name *S. verticillata* Roxburgh will be available.

141. SCOLOPENDRIUM LANCEOLATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:501. 1844. =**Polypodium pedunculatum** (Hook. & Grev.) Mett. ex Salom. Nomencl. Gefässkrypt. 312. 1883.

Ceterach pedunculata Hook. & Grev. Icon. Fil. 1:*t. 5.* 1827. Type: Sylhet, sent by Wallich and collected by "D. Smith."[4] The holotype at Kew shows that it was sent by Smith, but the label does not read "D. Smith," as Hooker and Greville did not use this form consistently. M. R. Smith, who collected ferns in Sylhet in 1812, was intended, the same Smith who sent specimens to Roxburgh.

Grammitis hamiltoniana Wall. Num. List. no. 9. 1829, nom. nud. Based on Sylhet, *Di Silva* (E. Ind. Co. Herb.–K, Morton photograph 14636).

Ceterach indivisa Hook. & Grev. ex Wall. Num. List no. 9-2, nom. nud. Based on Nibari, Nov. 26, 1808, *Buchanan-Hamilton.*

Selliguea hookeri Presl, Tent. Pterid. 216. 1836, an illegitimate renaming of *Ceterach pedunculata* Hook. & Grev., and so with the same type as that.

Selliguea hamiltoni K. B. Presl, op. cit., nom. illeg.

Gymnogramma hamiltoniana Hook. Sp. Fil. 5:160. 1864. An illegitimate renaming of *Ceterach pedunculata* Hook & Grev., and so with the same type as that (although intended to be based on *Grammitis hamiltoniana* Wall.).

TYPE: Chittagong, ***Roxburgh*** (G, Morton photographs 6554, 17027).

This Roxburgh specimen from Chittagong is probably a part of the same collection as the type of *Ceterach pedunculata,* for the locality Sylhet was referred to by Roxburgh as Chittagong, a sort of general name for this district, and many of Roxburgh's specimens from Chittagong were sent him by M. R. Smith; however, this cannot be proved. In any case *S. lanceolatum* Roxburgh is legitimate, based on a different collection and not on the holotype of *Ceterach pedunculata* Hook. & Grev., although the two are doubtless taxonomic synonyms.

This species, known as *Colysis pedunculata* (Hook. & Grev.) Ching by those who segregate *Polypodium*, appears to be somewhat variable. The Hooker and Greville type has the sterile blades broad and abruptly narrowed at the base, with the stipe slightly alate; the fertile fronds are small and exceed the sterile. The type of *Scolopendrium lanceolatum* has narrower blades that are gradually long-decurrent at the base, with the stipe alate; the fertile blades are shorter than the sterile. However, these differences are such as might occur within the same colony. On the

[4] Dr. Jarrett has pointed out that the "D." stands for "Dominus" (Master).

other hand, there may be some differences in the venation, that of *Ceterach pedunculata* is a little simpler in spite of the broader blades; in *S. lanceolatum* there are about four secondary areoles between the main lateral veins, each of these with one or two free included veinlets. The type of *S. lanceolatum* is closely matched by the following collection: middle elevation of Khao Chong, Pukat, Thailand, 600–1100 m., Jan. 27, 1966, *Tagawa, Iwatsuki & Fukuoka* 6805 (US), and there are several quite similar specimens at Kew.

142. TRICHOMANES CAMPANULATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:518. 1844.

Hymenophyllum campanulatum Wallich, Num. List. 66, no. 2199. 1830, nom. nud.

Didymoglossum plicatum van den Bosch, Ned. Kruid. Arch. 5(3):139. 1863. Syntypes: Malacca, Malaya, *Griffith* (K, Morton photograph 19028); Ceylon, *Thwaites* C. P. 2985 (K, not seen); and Sumatra, *Teysman* (not seen). The first is designated lectotype.

Trichomanes plicatum Bedd. Ferns Brit. Ind. *t. 285*. 1868.

LECTOTYPE: A specimen in the Brussels Herbarium with the name in the hand of Roxburgh (Morton photograph 19846). Roxburgh's description states that it was collected in Chittagong [East Bengal, now East Pakistan] by Buchanan-Hamilton. Isotypes are in the British Museum (Morton photograph 6576), in Geneva (Morton photograph 6550), and in Kew (East Ind. Co. Herb. 2199, Morton photograph 15746). All these represent the same species and seem clearly a part of the same collection.

In the "Index Filicum," *Trichomanes campanulatum* is listed as a dubious species. It was overlooked by Copeland in his monograph and by Holttum in his "Ferns of Malaya." It is a rather distinctive species, clearly the same as *T. plicatum* (van den Bosch) Beddome, as treated recently by Sledge in his "The Hymenophyllaceae of Ceylon" (Journ. Linn. Soc. Bot. 60:289–308. 1968). The species has passed generally as *T. latealatum* (van den Bosch) Christ, but the type of that (East Indies, *Griffith*, K, Morton photograph 19027) shows that *T. latealatum* does not have the densely pubescent stipe wing that is characteristic of *T. campanulatum*.

143. TRICHOMANES CARUIFOLIUM Roxburgh, Calcutta Journ. Nat. Hist. 4:519. 1844. =**Trichomanes obscurum** Blume, Enum. Pl. Jav. 2:227. 1828.

Lectotype: "Ad terram Buitenzorg," Java, *Zippel* (L, Morton photograph 2457). Blume indicated for his material: "Crescit in sylvis montanis humidioribus Javae et Moluccarum." The only specimen from Java with the name in Blume's hand is the one selected as lectotype. The syntypes from the Molucca Islands are represented by two specimens collected by Reinwardt: one is indicated as "Sylvae elatiores montis Tidore," and the other has had a "Type" tag affixed and is a possible lectotype; but it is better to choose the one from

Java. The holotype of *T. obscurum* var. *adnatum Blume* (loc. cit) is Java, "crescit ad ripas fluvirum in sylvis Javae occidentalis," *Blume*, according to the original description (L, Morton photograph 2430). The holotype of *T. obscurum* var. *obtusiusculum* Blume (loc. cit) is Java, "crescit in Javae montis Salak," *Blume*, according to the original description (L, Morton photograph 2429). These varieties of Blume do not appear to differ significantly from the typical variety.

TYPE: A specimen in Brussels with the name *T. caruifolium* in the hand of Roxburgh and the number 2430 (Morton photograph 19848, right-hand plant). Since this is the only specimen seen in the herbaria at Kew, British Museum, Geneva, and Brussels, it may be considered a holotype. According to Roxburgh, it came from Prince of Wales Island, i.e., Penang Island, Malaya.

In the "Index Filicum," *T. caruifolium* is listed as a dubious species, and the name is ignored by Copeland in his monograph of *Trichomanes* and by Holttum in his "Ferns of Malaya." The type represents a small but typical plant of *T. obscurum* Blume, which is common in Malaya.

144. TRICHOMANES LACINIATUM Roxburgh, Calcutta Journ. Nat. Hist. 4:518. 1844.

Trichomanes asplenioides K. B. Presl, Hymen. 37. 1843, non Swartz, 1788. Type: Philippine Islands, *Cuming* 184 (isotype US).

Cephalomanes asplenioides K. B. Presl, Abhandl. Boehm. Gesell. Wiss. V, 5:334. 1848. To be considered a new name for *T. asplenioides* K. B. Presl, non Swartz.

Cephalomanes asplenioides K. B. Presl, Abhandl. Boehm. Gesell. Wiss. Type: Philippine Islands, *Cuming* 169 p.p. (holotype PRC, photograph by Holttum US; isotype L, Morton photograph 2420; other isotypes reported by Holttum in K and BM). The specimen at Leiden gives the locality specifically as South Camarines.

Trichomanes preslii Morton, Contr. U. S. Nat. Herb. 38:190. 1968. Based on *Trichomanes asplenioides* K. B. Presl, non Swartz, 1788.

LECTOTYPE: A specimen in Brussels mounted on the same sheet as the type of *Trichomanes caruifolium* Roxb. (Morton photograph 19848). This sheet contains two species of *Trichomanes*, one of which agrees with the description of *T. caruifolium* and the other with the description of *T. laciniatum*. Since no specimen has been found labeled *T. laciniatum*, this is likely the holotype and the only material existing. According to Roxburgh, it was collected in the Molucca Islands, and doubtless was received by Roxburgh from Christopher Smith, who probably collected it either in Amboina, Ternate, or Honimoa. Amboina is likely, since most of Smith's collections came from there, and since there is a specimen from Amboina (*Robinson* 1964, US) that agrees with the lectotype in every way.

The lectotype has the involucres apical as described by Roxburgh, and it therefore agrees with *Trichomanes asplenioides* K. B. Presl as treated by Copeland in his monograph (Phil. Journ. Sci. 51:249. 1933). Although this species is mostly con-

fined to the Philippine Islands, Copeland did refer *Robinson* 1964 to it. *Trichomanes javanicum* Blume is supposed to differ in having the involucres borne along the distal margin rather than apically, but whether this is a true difference remains to be determined. Since *T. asplenioides* K. B. Presl (1843) is an illegitimate later homonym, the earliest name for the species is *T. laciniatum* Roxb., if it proves different from *T. javanicum*. The new name *Trichomanes preslii* Morton, proposed for *T. asplenioides* K. B. Presl, not Swartz, now proves to be a taxonomic synonym of *T. laciniatum*.

Another name that I did not consider when proposing *T. preslii* is *Cephalomanes oblongifolium* K. B. Presl. Presl stated that his *C. oblongifolium* differed from his *C. asplenioides* in fronds, pinnae, and sori, but he did not state the differences; from the isotype specimens examined, and the photograph of the holotype of *C. oblongifolium*, it does not appear that two species can be distinguished, and therefore *C. oblongifolium* also becomes a taxonomic synonym of *T. laciniatum* Roxb. The type of *C. oblongifolium* is *Cuming* 169 in part, the other part being the type of *Cephalomanes atrovirens* K. B. Presl, which is also close to *C. asplenioides*, but which is kept distinct by Copeland.

145. TRICHOMANES LUCIDUM Roxburgh, Calcutta Journ. Nat. Hist. 4:519. 1844. =**Davallia denticulata** (Burm. f.) Mett. ex Kuhn, Fil. von Deck. Reise 27. 1867.

Adiantum denticulatum Burm. f. Fl. Ind. 236. 1768. Type: Java, *Burmann* (holotype G, Morton photograph 16909).

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with the name in the hand of Roxburgh and the number 2431. According to Roxburgh, his plant came from the Prince of Wales Island, i.e., Penang Island, Malaya, where it was collected by W. Hunter. There is an isotype in the Geneva Herbarium from "India Orient. Dr. Roxburgh" and a label "Typus" (Morton photographs 6553, 16908). Another isotype is in the East India Company Herbarium, no. 253-3 (Morton photograph 15733, the small plant in the upper right corner).

The published account gives as a synonym "*Davallia elegans* Willd. Wall. Cat. 64, no. 253," a citation added by the editor Griffith, which was intended to mean *D. elegans* sensu Wallich as to page 64, no. 253 (actually no. 253–3, which is the Roxburgh collection), and not that *D. elegans* Willd. is a synonym; actually there is no species *D. elegans* Willd., only *D. elegans* sensu Willd. (Sp. Pl. ed. 4, 5:471. 1810), for the account of Willdenow is based on three cited synonyms and the epithet *elegans* derives from Swartz.

The type of *Adiantum denticulatum* Burm. f. in Geneva has the involucres rather short and broad and the lateral teeth rather blunt; the Roxburgh plant has the teeth sharper and the false veins more obvious, but it is doubtless conspecific with the Javan *D. denticulata.* The lectotype of Roxburgh's species has been identified as *D. elegans* var. *bidentata* Hook. There is in Brussels a second sheet of *T. lucidum* that has much broader segments that are only slightly toothed; it is doubtless a part of the same collection, for this species is subdimorphic, the sterile blades having broader segments.

146. TRICHOMANES MALAYANUM Roxburgh, Calcutta Journ. Nat. Hist. 4:519. 1844. =**Sphenomeris chinensis** (L.) Maxon, Contr. U. S. Nat. Herb. 17:159. 1913. Type: China, *Osbeck* (S). Concerning the nomenclature of this species, see F. R. Fosberg (Taxon 18:596. 1969). The species has sometimes been wrongly called *Sphenomeris chusana* (L.) Copel.

LECTOTYPE: Malay Islands, *Roxburgh* (G, Morton photograph 6552). This specimen is determined as "*Trichomanes sinense* Roxb.," but not by Roxburgh, and this may be assumed to be a reidentification, an error for *T. chinense* L., which this specimen does represent. Roxburgh may have intended to withdraw his *T. malayanum* in favor of *T. chinense,* but Griffith published the species anyway as *T. malayanum.* This lectotype agrees with Roxburgh's description, and so it is a suitable lectotype.

There is a specimen in the British Museum collected in Ternate by Christopher Smith that is labeled *T. malayanum* Roxburgh, but not by Roxburgh. It also represents *S. chinensis,* but is a small plant, hardly more than 25 cm. high, whereas Roxburgh described his species as four to five feet high. The lectotype in Geneva is a large plant that agrees better with this description.

147. VITTARIA DIVERGENS Roxburgh, Calcutta Journ. Nat. Hist. 4:510. 1844. =**Lindsaea divergens** Hook. & Grev. Icon. Fil. 2: *t. 226.* 1831. Type: "India orientali, Herb. Roxb." ex Wallich (presumably K, not seen). There ought to be an isotype in the East India Company Herbarium under no. 2191, but it is not there now; perhaps it has been misplaced. The specific locality was not known to Hooker and Greville; it is "Prince of Wales Island," i.e., Penang Island, where it was collected by W. Roxburgh, Jr.

Vittaria divergens Roxburgh ex Wallich, Num. List. no. 2191. 1830, nom. nud.

Isoloma divergens (Hook. & Grev.) J. Smith, Journ. Bot. Hook. 3:414. 1841.

Schizoloma divergens (Hook. & Grev.) Kuhn, Chaetopt. 346. 1882.

TYPE: Considered the same as the type of *Lindsaea divergens* Hook. & Grev., which is based on specimens of the same species sent to Wallich. No specimen in the Roxburgh collection in Brussels was located.

According to Holttum (Ferns of Malaya, ed. 2. 337. 1966), this is a peculiar species found only in Malaya and Borneo. Its characters seem to be well shown in the Hooker and Greville plate.

148. VITTARIA INTERRUPTA Roxburgh, Calcutta Journ. Nat. Hist. 4:511. 1844. =**Lindsaea interrupta** (Roxburgh) Morton, comb. nov.
Lindsaea interrupta Wallich, Num. List no. 2195. 130, nom. nud.
Lindsaea cambodgensis Christ, Notul. Syst. 1:58. 1909. Type: Cambodia, *Bouillod* 61 (P, 2 sheets, photograph Kramer, US).

LECTOTYPE: A specimen in the Brussels Herbarium first labeled "*Pteris*" by Roxburgh, this crossed out and *Vittaria* substituted (Morton photograph 19912). That this is authentic material and probably the actual holotype is likely. Of the eight species of "*Vittaria*" and *Lindsaea* described by Roxburgh, this is the only Roxburgh collection that agrees with the description of *V. interrupta* in having the sori "interrupted" by the breaks in the margin, described by Roxburgh as "gash-dentate." The other Roxburgh species of "*Vittaria*" have the margins entire and the sori continuous. That this is the type is further indicated by the handwriting of W. Roxburgh, Jr., on the label reading: "Grows on the ground in shady cool places. The roots are sent." This was quoted directly by Roxburgh in the original description of *V. interrupta* as: "Found by Mr. W. Roxburgh, growing on the ground, in shady cool places on Prince of Wales' Island."

149. VITTARIA LINEATA sensu Roxburgh, Calcutta Journ. Nat. Hist. 4:509. 1844, non Swartz. =**Vittaria ensiformis** Swartz, Gesell. Naturf. Freunde Berlin Neu. Schr. 2:134, *t. 7, f. 1.* 1799, at least as treated by Holttum (Ferns of Malaya 613. 1954).

AUTHENTIC MATERIAL: A Roxburgh drawing, no. 1755, at Kew (Morton photograph 15884). No herbarium specimens have been noted, but not all herbaria were searched for this species. Roxburgh gave the locality as "Prince of Wales Island, from whence introduced into the Botanic Garden [Calcutta] by Mr. W. Roxburgh, Jun."

From the description, drawing, and locality, Roxburgh's plant could only be *Vittaria ensiformis* Swartz or *V. elongata* Swartz, as treated by Holttum in the "Ferns of Malaya." In the shape of the fronds and small size it agrees best with *V. ensiformis.* Whether this is the true *V. ensiformis,* the type of which is from the Mascarene Islands, remains to be determined.

The American species *Vittaria lineata* has usually been attributed to J. E. Smith in the original publication of the genus *Vittaria,* in 1793. But Smith merely indicated that *Pteris lineata* L. belonged in his genus and was in fact the only species in his genus, but he did not formally make the combination *V. lineata* (L.) J. E. Smith, as cited in the "Index Filicum" and elsewhere. I have not searched all the literature between 1793 and 1806, but it appears that the proper authority is *V. lineata* (L.) Swartz, Syn. Fil. 109. 1806.

150. VITTARIA LUNULATA Roxburgh, Calcutta Journ. Nat. Hist. 4:510. 1844. =**Lindsaea parasitica** (Roxburgh) Hieron. Hedwigia 62:14. 1920 (simply pinnate form).

Lindsaea scandens Hook. Sp. Fil. 1:205. 1846. One of the syntypes is from Penang Island, *Dalhousie*. This represents the same simply pinnate form as *V. lunulata*.

TYPE: A specimen in the Brussels Herbarium with the name *lunulata* in Roxburgh's hand, the number 2121, and a label "Typus" (Morton photographs 5151, 19913). According to Roxburgh it was from Prince of Wales Island, i.e., Penang Island, where it was probably collected by W. Roxburgh, Jr.

The above identification follows the identification of K. Kramer, who wrote on the label: "There is no proof that this is a type." However, the evidence is clear that this is actually the holotype, for it is from Roxburgh's personal herbarium, first in the custody of the Linnean Society, London, purchased in 1863 by Martius, and later purchased by Brussels; the specimen agrees with the original description and is the only Roxburgh specimen found that does, and the name *V. lunulata* is in Roxburgh's own hand.

151. VITTARIA PARASITICA Roxburgh, Calcutta Journ. Nat. Hist. 4:510. 1844. =**Lindsaea parasitica** (Roxburgh) Hieron. Hedwigia 62:14. 1920.

Lindsaea parasitica Wallich, Num. List. no. 2196. 1830, nom. nud. Based on *Vittaria parasitica* Roxburgh, in 1830, also a nom. nud.

LECTOTYPE: A Roxburgh specimen in the Brussels Herbarium with a label reading in Roxburgh's hand "between *Lindsaea* & *Pteris*," which was crossed out and "*Vittaria*" written in, and in the hand of Roxburgh's Jr.: "This is growing on part of the stem of a small tree I cut down. It grows for . . . 4–6 feet in cool shady places" (Morton photographs 5153, 19915). In the above quotation one word is illegible, but that is not important. This specimen does not bear the name *V. parasitica*, but it is surely authentic. There is a duplicate of this lectotype in Geneva marked "Prince of Wales Island, Dr. Roxburgh" (Morton photograph 6568).

Of Roxburgh's species of "Vittaria," this is the only one that agrees with the original description and the only one that is indicated in the description as being "parasitic"—the term used in the early days for "epiphytic"—an unusual character in *Lindsaea*, most of the species of which are strictly terrestrial. That this character struck Roxburgh too is indicated by his choosing the specific epithet "*parasitica*." Roxburgh obtained his information on the habitat from the label of Roxburg, Jr., stating that he had collected the specimen 4–6 feet up on a small tree. From my general survey of Roxburgh's species, it seems that most of the species described definitely or probably from "Prince of Wales Island" (Penang Island) were collected by W. Roxburgh, Jr. There is no specimen in the East India Company Herbarium un-

der no. 2196, which is listed by Wallich as "*Lindsaea parasitica* Herb. Roxb. (sub *Vittaria*)," and it is likely that Wallich did not have a specimen, but saw this Brussels specimen, which was at the time in the Roxburgh Herbarium in the Linnean Society, London.

Lindsaea parasitica Wallich (Num. List. no. 2196. 1830) was a nomen nudum and based on *Vittaria parasitica* Roxburgh, which was also in 1830 a nomen nudum. Therefore Wallich's name cannot be correct. The first worker to take up and accept the name *Lindsaea parasitica* after the publication of *Vittaria parasitica* Roxburgh in 1844 was apparently Hieronymus in the publication cited above; however, Hieronymus wrongly gave Wallich as the authority for the combination. He did not mention Roxburgh, but his combination is indirectly connected with Roxburgh's *Vittaria parasitica* through Wallich's citation under his no. 2196. The valid combination *L. parasitica* (Roxburgh) Hieron. has been overlooked in the "Index Filicum." The question of the proper authority was discussed by Kramer (Blumea 15:570. 1967 [1968]), who came to the same conclusion.

152. VITTARIA RESECTA Roxburgh, Calcutta Journ. Nat. Hist. 4:510. 1844.
=**Lindsaea javensis** Blume, Enum. Pl. Jav. 219. 1829.

TYPE: No specimens have been found named *V. resecta* by Roxburgh nor any herbarium specimens of Roxburgh's collections agreeing with the original description. Roxburgh's plant came from Chittagong, East Bengal, now East Pakistan.

Unless Roxburgh herbarium specimens can be found agreeing with the original description, this species can be identified only from the description. Kramer (Gard. Bull. Singapore 26(1): 47. 1972) was unable to place the name definitely. The original description calls for a small plant only 12.5–25 cm. long, simply pinnate, with the pinnae subtrapeziform, obtuse, and the sorus in a continuous line on the anterior margin and around the apex.

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